Physics Without Frontiers Annual Meeting 2024
3rd December 2024

The Abdus Salam International Centre for Theoretical Physics
Physics Without Frontiers

Université de Lomé

Physics Without Frontiers 2024 - Togo

Materials Modeling and Simulations: Electronic Structure Theory

5th – 9th August 2024, University of Lomé, Togo

Physics Education and Research in Togo

- Location: **West Africa**
- Capital: **Lomé**
- Official language: **French**

2 public universities offering degree programs in physics

University of Lomé

Degree programs: Bachelor, Master, and Doctorate levels

Research focus: Mainly condensed matter physics

- Energy, materials, and components-signals-systems
- Energy transfers, processes, and systems

Majority of researchers are engaged in experimental work

At least 1 group focused on materials simulations

Project Goals

Introduce students to materials modeling and simulations

Basic foundations and hands-on experience in electronic structure theory

Provide a platform for interaction

Provide a platform for students to interact with experienced researchers in a dynamic and vibrant knowledge sharing environment.

Initiate mentoring and mobility opportunity for students

Identify talented and motivated students and provide them with support in applying for international opportunities.

Develop collaborations

Foster and potentially initiate collaborations and networking between local physicists with their international peers.

Team

Organizers and Speakers

Dr. Sylvia M. MUTISYA
IMT Atlantique, France
(Project Coordinator)

Prof. Milohum Mikesokpo DZAGLI
Université de Lomé, Togo
(Organizer)

Dr. Essodjolo KPATCHA
UAM-CSIC & IFT Madrid, Spain
(Organizer)

Prof. Mark E. CASIDA
Grenoble, France
(Invited Speaker)

Dr. Komi Apélété AMOU
Université de Lomé, Togo
(Local Coordinator)

Dr. Komlan S. GADEDJISSO-TOSSOU
Université de Lomé, Togo
(Organizer)

Dr. Katawoura BELTAKO
Université de Lomé, Togo /
University of Augsburg, Germany
(Organizer & Speaker)

Dr. Komi SODOGA
Université de Lomé, Togo
(Organizer & Speaker)

Team

Tutors

Anani K. DONKATA
PhD student
Université de Lomé /
Quantum ARISE - LPMCS

Delchère DON-TSA
PhD student
Université de Lomé /
Quantum ARISE - LPMCS

K. Jacques KOTOKO
PhD student
Université de Lomé /
Quantum ARISE - LPMCS

D SAMBIANI
PhD student
Université de Lomé /
Quantum ARISE - LPMCS

Opening Session Highlights

- Attendance of University officials: **Vice-President** of the University of Lomé, Prof. Komlan Batawila; **Dean of the Faculty of Sciences**, Prof. Kwashie Eklou-Gadegbeku; the **Head of the Physics Department**, Dr. Komi Amou, the **Heads of the Mathematics** and **Chemistry Departments**
- The officials expressed joy and aspirations for the event's continuity
- Emphasized the event’s value to students, researchers, the Department of Physics, and the University of Lomé

Program Highlights

- **17.5 hours** of lectures
- Hands-on sessions in the afternoons (Quantum Espresso software)
- **6 project** groups (results presented on the final day)

Career Session Highlights

- Presentations on ICTP opportunities for students
- Panel discussion on accessing international opportunities
- Guidance on how to apply for academic and research positions globally
- Insights into building a successful international career in physics


Université de Lomé
FACULTY OF SCIENCES
PHYSICS DEPARTMENT
& Physics Without Frontiers - PWF
60 ICTP 1964-2024
PWF TOGO
Materials Modeling
August 5th to 9th, 2024
Starting At 08:00am
Materials Modeling and Simulations - Electronic Structure Theory and Machine Learning
Auditorium Confucius at Université de Lomé
Attendance
pwftogo@gmail.com
More information
ICTP Physics Without Frontiers

Group photo

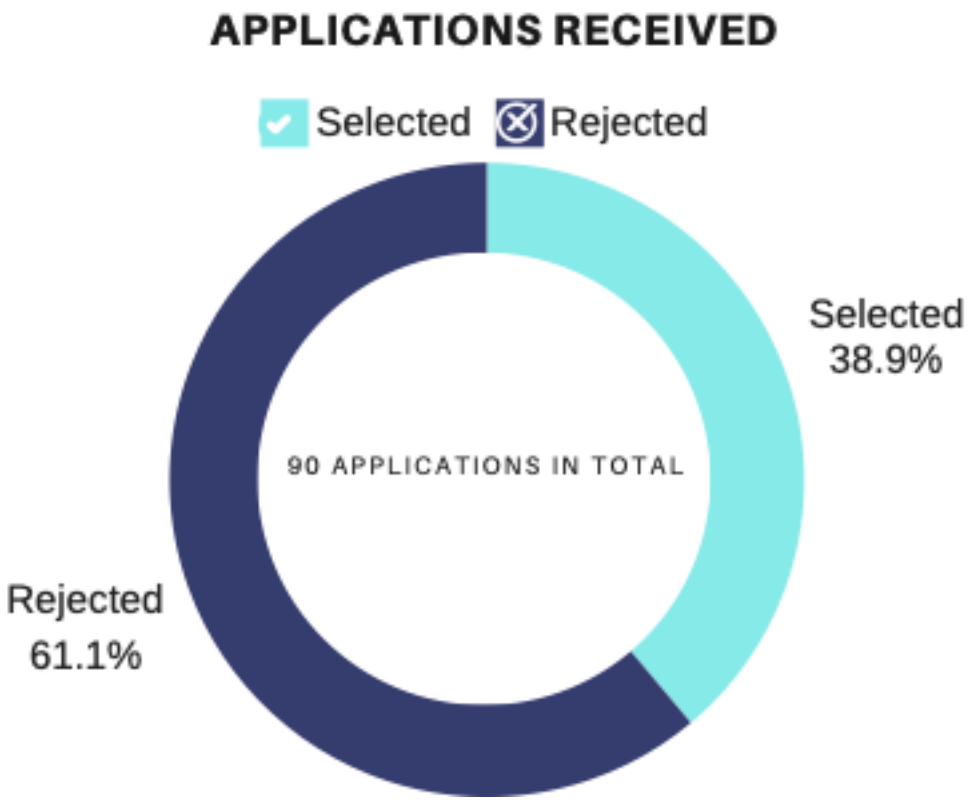
Media Coverage

Opening of the Physics School on Materials Modeling and Simulation

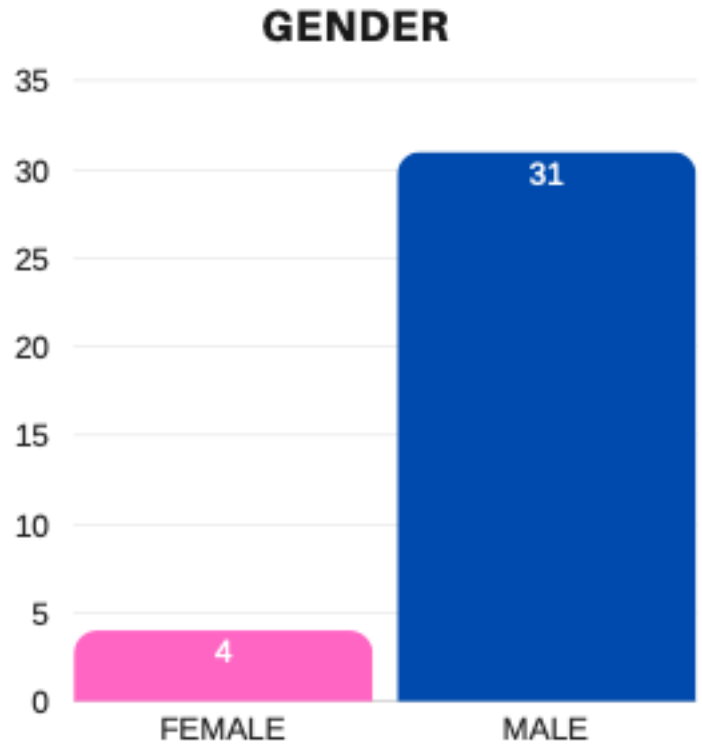
Local press media

Evaluation

High interest in participation

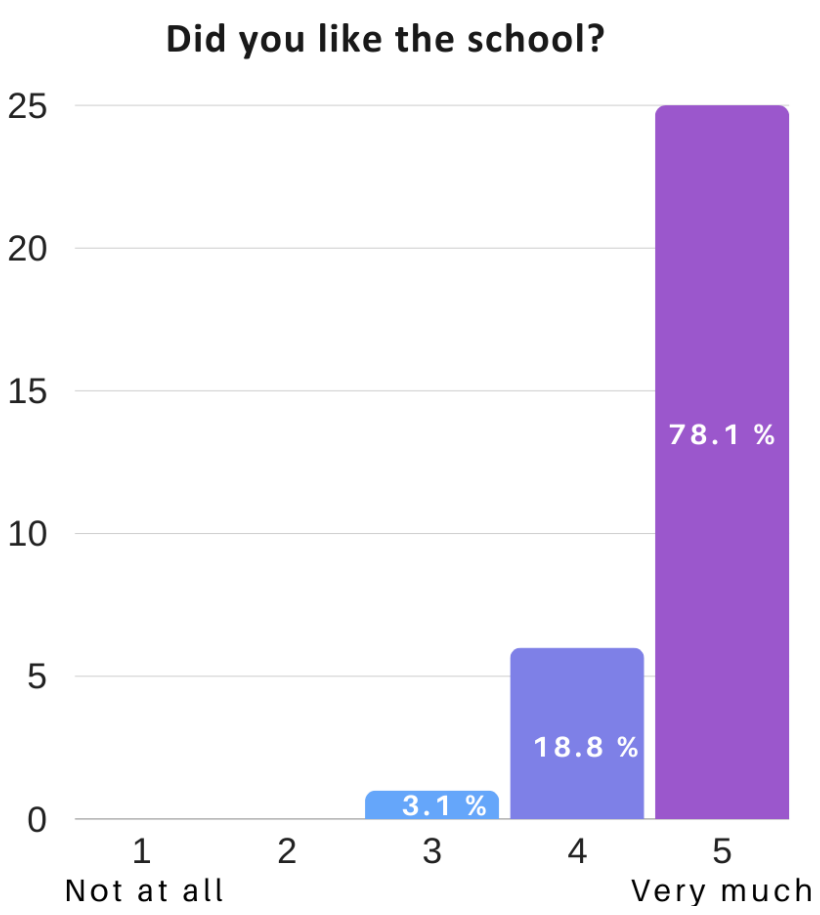


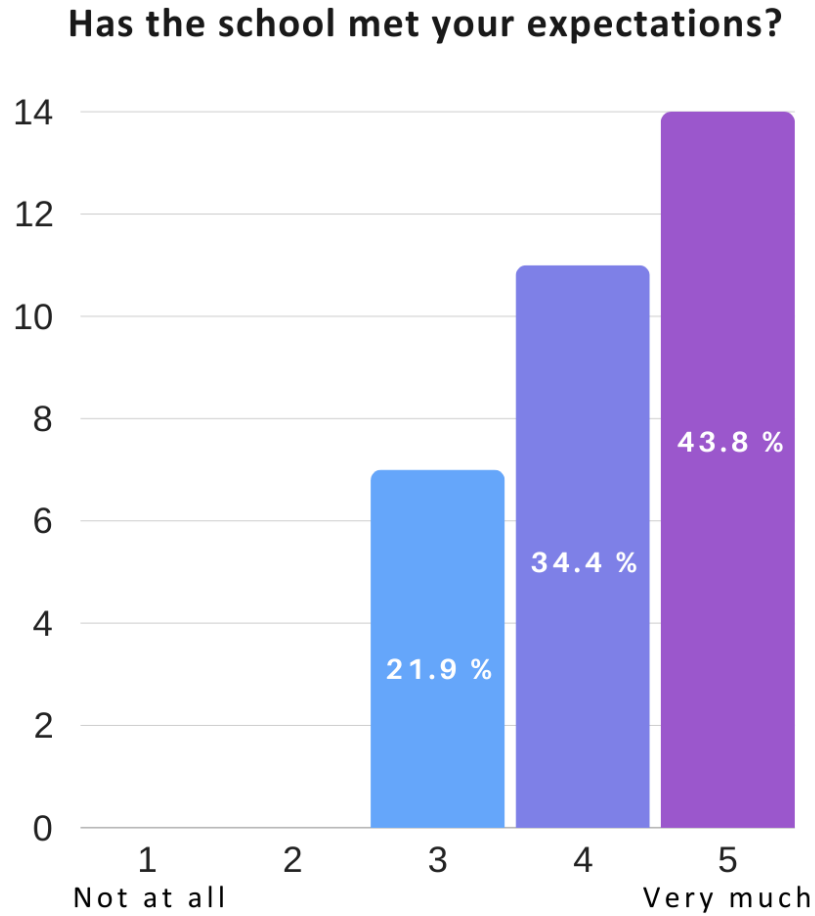
Selected Participants



Evaluation

Positive feedback from participants





Impressions

Irène AMEDJI
Quantum ARISE intern
participant

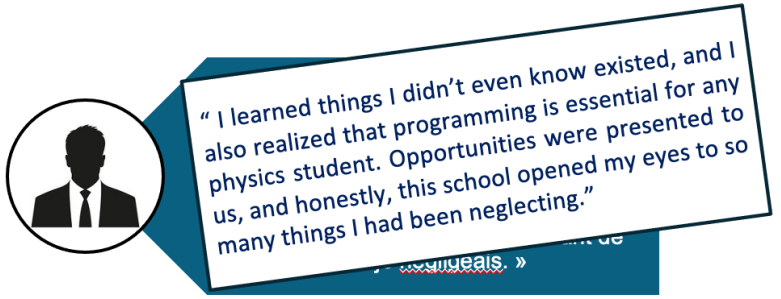
“This is the first time I've taken part in such an event, bringing students together to discuss such a delicate and futuristic subject.

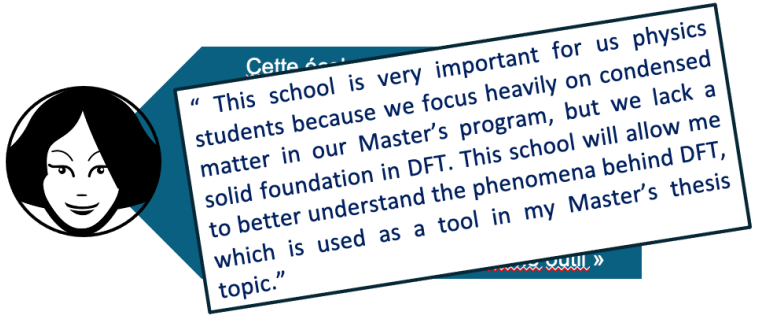
Although I'm not in the field of quantum computing or machine learning, I did learn things like :
-Quantum Expresso installation and his usefulness;
-Electronic structure theory;
-Material modeling…
And the best is networking with physics PhD and Masters students.
I hope we’ll have another meeting like that to learn more from each other but this time like a mini hackathon.”

Emmanuel AMELA
Quantum ARISE intern
Participant

“As a developer, participating in PWF has had a profound impact on me, especially in the way physicists integrate technology into their research, using tools like Quantum Espresso to solve complex problems. The workshops and the career session were also very inspiring, reinforcing my desire to pursue a career in physics.

It is essential for a physics student to participate in such an event, which provides a valuable opportunity to learn and master the practical use of computer tools specific to their field.”





Conclusions

Lessons

- The workshop was **highly appreciated** by students, lecturers and the university of Lomé.
- The 1 - week duration was **too short** to adequately cover both theory and practical sessions.

Future Perspectives

- Continue to collaborate with PWF to organize similar events in the future.
- Plan **two-week-long schools** with **additional speakers** to cover a broader range of topics in materials simulation.

Acknowledgements

- Grateful to the ICTP Physics Without Borders team, especially **Dr. Natasa Stojic**, for guidance throughout the project's initiation, planning, and execution.
- Grateful to our invited speaker, **Prof. Casida** for their exceptional efforts and outstanding delivery of the course.
- Appreciate funding support from **PWF** and the **ARISE project** (African Research and Initiative for Scientific Excellence).
- Grateful to the **University of Lomé** for hosting the event and providing the essential infrastructure that played a pivotal role in the success of the project.

THANK YOU

Resources

Lecture notes - Link to Google Drive Folder

Impressions from Tutors

Impressions

Anani K. DONKATA
PhD student
Université de Lomé /
Quantum ARISE - LPMCS

Participating as a tutor at Physics Without Frontiers 2024 - Togo has been an enriching and transformative experience. This initiative not only provides a platform to share knowledge but also fosters connections between scientists and aspiring students

As a tutor, I had the privilege of engaging with a diverse group of highly motivated students. Their enthusiasm and curiosity reminded me of the importance of bridging gaps in scientific education. It was incredibly rewarding to witness their growth, not just in their understanding of physics but also in their ability to approach problems with critical thinking and creativity.

Moreover, the opportunity to work alongside passionate educators and researchers within the PWF community has been inspiring. The collaborative nature of the program emphasizes the value of teamwork and the global nature of scientific endeavors.

Impressions

Anani K. DONKATA
PhD student
Université de Lomé /
Quantum ARISE - LPMCS

This experience has reinforced my commitment to contributing to scientist outreach initiatives. I leave with a renewed sense of purpose and a deeper appreciation for the role of science as a universal language that connects people across borders. It is a testament to how collective efforts can empower the next generation of scientists, fostering innovation and progress worldwide.

Participating as a tutor with Physics Without Frontiers has been an incredibly fulfilling and impactful experience. The enthusiasm of the students and the collaborative spirit of the program have reinforced my belief in the importance of making science accessible to everyone, regardless of location or resources. I sincerely hope that this initiative continues to grow, reaching even more students and inspiring the next generation of scientists.

Impressions

Delchère DON-TSA
PhD student
Université de Lomé /
Quantum ARISE - LPMCS

Participating as a tutor at Physics Without Frontiers 2024 - Togo was an exceptional experience. This program provided a unique opportunity to guide talented students through concepts in materials modeling and electronic structure theory. Working with them on a challenging project allowed me to witness their determination and ability to tackle scientific challenges, while also deepening my own understanding through this enriching exchange.

What stood out to me the most was the students' energy and commitment when faced with problems. Although we encountered obstacles, each challenge became an opportunity to learn and innovate together. Events like this are invaluable for inspiring and motivating young researchers, fostering the exchange of knowledge, and driving collaborative scientific growth. We would truly welcome more events like this, again and again, as they play a crucial role in advancing scientific development and empowering the next generation of researchers to contribute to global science.

Impressions

K. Jacques KOTOKO
PhD student
Université de Lomé /
Quantum ARISE - LPMCS

Participating as a tutor at Physics Without Frontiers 2024 - Lomé/Togo was a truly rewarding experience, both personally and professionally. It allowed me to reflect on my role as a PhD student working on DFT simulations of 2D materials for energy applications.

I discovered a newfound confidence in my ability to communicate complex scientific concepts and engage with motivated students. Seeing their curiosity and enthusiasm during lectures and tutorials was inspiring.

The groups I worked with on projects particularly stood out for their creativity, teamwork, and commitment, which further highlighted the potential of the next generation of researchers.

Impressions

K. Jacques KOTOKO
PhD student
Université de Lomé /
Quantum ARISE - LPMCS

However, one challenge we all faced was the **limited duration** of the event. Both the students and I believe that future editions should be extended to at least **two weeks**, allowing for more in-depth learning and project development. Additionally, enriching the program with **more professors** specializing in relevant fields would greatly enhance the experience.

Overall, this experience strengthened my passion for research and the importance of knowledge sharing. It reminded me of the collective power of collaboration and the impact we can have by nurturing emerging talent. I am grateful for this opportunity to contribute, connect, and be inspired by such an eager and talented group of students.

Impressions

D SAMBIANI
PhD student
Université de Lomé /
Quantum ARISE - LPMCS

Participating as a tutor in Physics Without Frontiers 2024 - Togo was an unforgettable experience. This program allowed me to mentor talented students in understanding concepts related to materials modeling and electronic structure theory. Specifically, I worked with them using Yambo to predict excitonic properties in molecules, a topic that combines theoretical rigor with practical applications. Collaborating on this ambitious project gave me the chance to witness their dedication and ability to tackle scientific challenges while enriching my own knowledge through this dynamic exchange.

What impressed me the most was the students' enthusiasm and perseverance when faced with difficulties. Each challenge became an opportunity for collective learning and reflection. Events like this are essential for encouraging and inspiring young researchers, promoting the exchange of knowledge, and strengthening scientific collaboration. We would be delighted to see such initiatives multiply, as they play a crucial role in advancing science and nurturing a new generation of researchers ready to address global challenges.