African School for Electronic Structure Methods and Applications

Theoretical Physics is Much More than Equations

Welcome address by Richard M. Martin
University of Illinois at Urbana-Champaign
Stanford University

ASESMA

African School for Electronic Structure Methods and Applications

A series of schools each 2 years to foster
a collaborative network for research and higher education within Africa

Endorsed by IUPAP (International Union of Pure and Applied Physics)

Supported by ICTP (International Centre for Theoretical Physics)
And other institutions

Nithaya Chetty

The key to the success of ASESMA is the long-term support by ICTP

Funding – People* – Administration

Sandro Scandolo

*** Sandro Scandolo, Paolo Gianozzi, Ralph Gebaur, Stefano de Gironcoli, …**

ASESMA

The First Part: the 10-year series from 2010 to 2020

2010 - Capetown
The first in the ASESMA series

The ASESMA Approach

Computational Science

The core guiding principle is that computation makes it possible to do world-class research with modest investment. Computation is important in every area of science and technology.

Choice of Topics

Electronic structure is an important field that is narrow enough to build up a network for joint work and collaboration, yet broad enough to span the range from fundamental physics to applications in materials science, chemistry, and many other fields.

An ASESMA school

Typically ~ 1/2 participants new to the field, 1/2 returning to increase their knowledge, collaborate, and tutor the new people.

Each school includes basic theory and methods and hands-on computing.
Each participant is involved in a project in an area of current research.

ASESMA

The new series with a larger vision for ASESMA – 2020-2030

Expanded

Activities - Focused workshops, visits, meetings, collaborations, ….

Topics - Materials Science, Chemistry, Biology, Machine Learning…..

Education – Teaching the teachers, computational sciences, …..

One example of consequences of ASESMA

US Africa Initiative for Electronic Structure (USAfrI)
Supported by American Physical Society

More about this later

What has ASESMA accomplished

Statistics for 2008-2021 (7 schools)

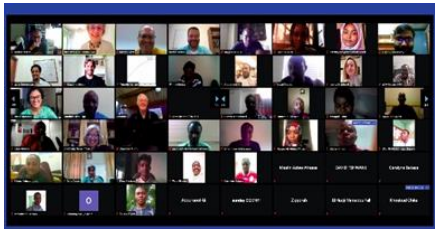
Total number of participations (counting multiple times for some participants)	**295**	(~40 in each school)
Total number of individual participants	**246**	
Number of African countries	**29**	
Number of Lecturers	**42**	**(15 from Africa)**
Number of Mentors	**41**	**(19 from Africa)**
Number of women	**25**	
Publications in refereed journals by participants after attending ASESMA (7 with multiple ASESMA authors)	**124**	**(as of May 2017)**

ASESMA Schools

246 participants from 29 African countries (2008 -2021)

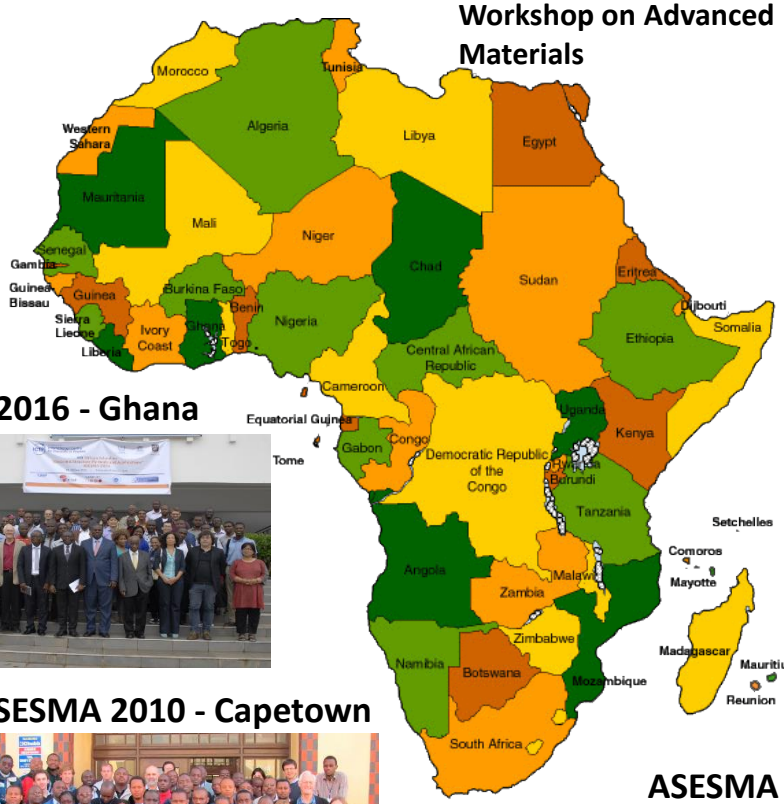
Many active Research Groups

ASESMA 2021 - Virtual
(Lecturers, Mentors)



Regional workshops (Mini-ASESMAs)
Republic of Congo 2017, 2021
Ethiopia – 2019
Rwanda - 2019
South Africa – 2019
Kenya – 2021
Cameroon - 2022

Sudan 2013, 2015
Tutorials at Khartoum
Workshop on Advanced Materials



ASESMA 2016 - Ghana

ASESMA 2018 - Ethiopia

ASESMA 2012 - Kenya

ASESMA 2023 – Rwanda
East Africa Institute for Fundamental Research

Sessions at African Materials Research Soc.
Botswana – 2017
Tanzania – 2019
Senegal - 2022

ASESMA 2010 - Capetown

ASESMA 2015 - Johannesburg

2008 - Capetown - Workshop that led to foundation of ASESMA

US Africa Initiative for Electronic Structure (USAfrI)

Funded by American Physical Society

Sponsored by the APS 2019 Innovation Fund

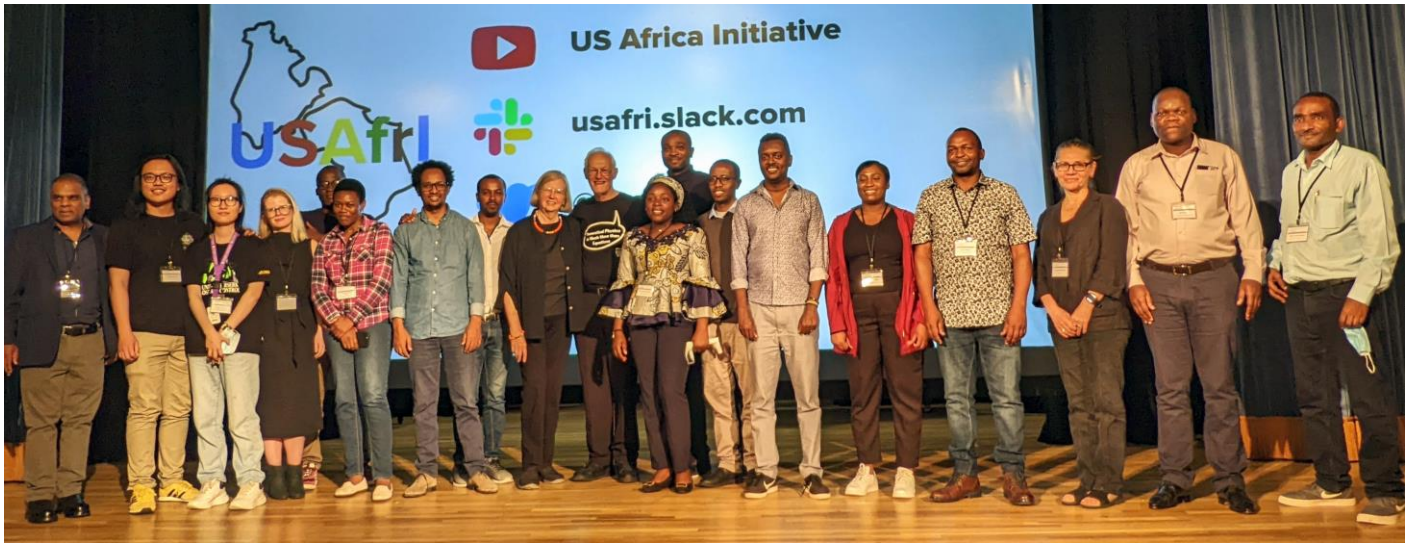
Meant to foster collaborations between US and African scientists

Renata Wentzcovitch
Omololu Akin-Ojo
Richard Martin
Sinead Griffin

Collaborations with the community built up by ASESMA!

In 2020-2022 workshops and visits to labs and universities in the US

15 African Scientists visit universities and labs in the US!



Started new interest in the US

Including 8 lecturers at this school – 6 with no previous African connections

Much more than Equations

Recent example of a successful initiative

James Sifuna and Javier Junquera

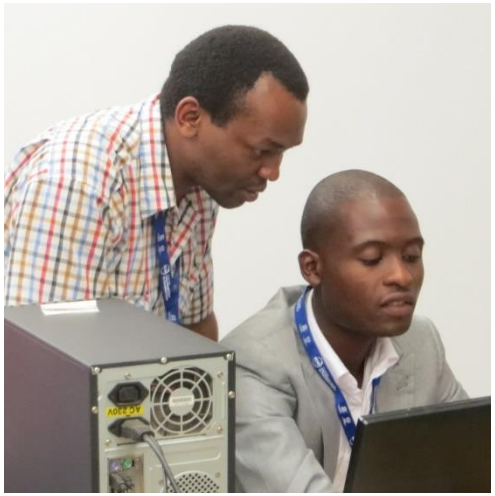
Javier arranged support from his University (Cambria, Spain) for a student to get a joint degree in Africa and Cambria

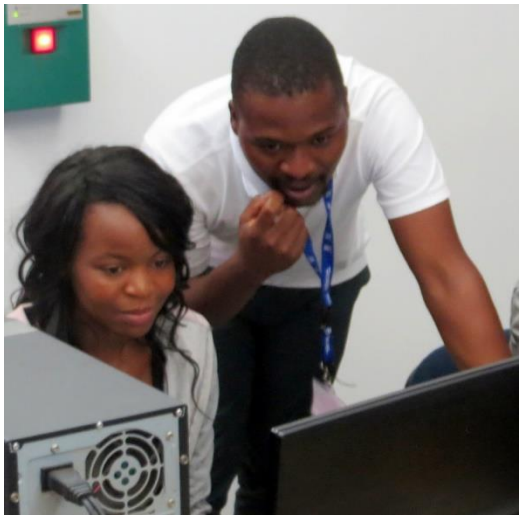
ASESMA advertised and identified appropriate students

James Sifuna from Kenya

Theoretical Physics is more than Equations

ASESMA is People





Success Stories

Three examples illustrating different types of success

Azima Seidu, from Ghana – Started* Many-body *work at ASESMA 2016.
Visited Matteo Gatti (lecturer 2015, 2016) at Ecole Polytechnique in Paris for 3 months.
Now studying for PhD in Finland

Azima with the lecturers Andrea Marini and Matteo Gatti Who lectured on many-body methods

George Manyali, participant 2010, 2012, Mentor 2015 PhD working with Daniel Joubert in South Africa Now Lecturer Physics Department, Masinde Muliro University of Science and Technology. Leader of Computational and Theoretical Physics Group

George as a mentor in 2015

Garu in audience in 2015

Garu Gebreysus – Ghana – no electronic structure experience before he was participants in 2015 – Started group in Ghana – organizer of 2016 and 2018 ASESMA schools!

Welcome to ASESMA 2023!