African Strategy for
Fundamental and Applied Physics

COMMUNITY TOWN HALL

ATOMIC AND MOLECULAR PHYSICS WORKGROUP

S. Kenmoe, O. Abah and I. Njifon

Tuesday, July 13th 2021

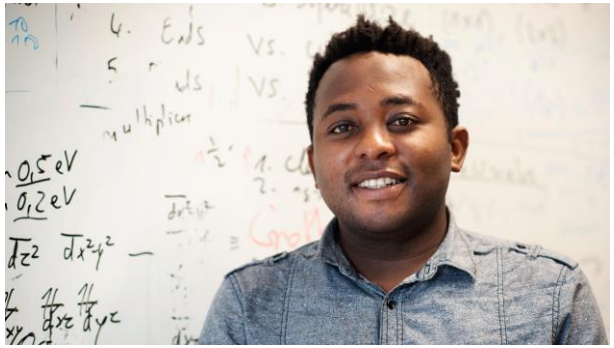
WORKGROUP CONVENERS

Obinna Abah, Nigeria
Theoretical Physics
Queen's University
Belfast, Ireland

Quantum thermodynamics and quantum control for technologies

Ibrahim Njifon, Cameroon
Computational Physics
National Nuclear labs
Montreal, Canada

Advanced nuclear fuels and material for nuclear application



Stephane Kenmoe, Cameroon
Computational Physical chemistry
University of Duisburg-Essen,
Essen, Germany

Energy and fuels production from molecules decomposition

Interacting matter in the eV range

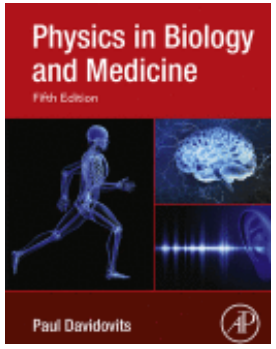
Atomic physics → Chemically bound → **Molecular physics**

Quantum mechanics
Quantum electrodynamics

Electronic structure

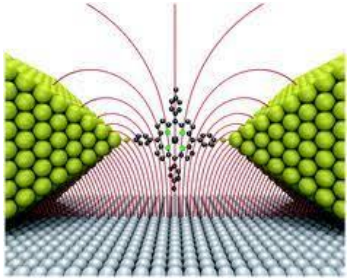
Quantum physics and chemistry
Dynamics, Spectroscopy

Physical chemistry, Chemical physics, Condensed Matter Physics, Energy, optics
Surface science, Biology, Medecine, Electronics, spintronics, heterogeneous catalysis…

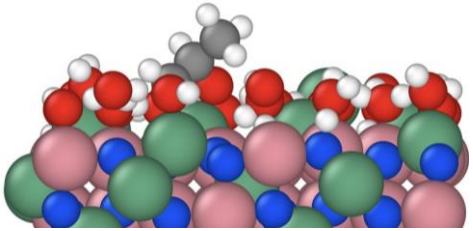


Biology and medecine

Electronic devices



Single molecule transistor



Chemicals production via selective oxidation

WORK STRATEGY

WP1: Identify the working groups in Africa and African scientists in the field all over the world.
ASP, LAM, electronic structure communities like ASESMA, CASESMA .

WP2: Reach the potential targets and send out formulars

WP3: Compile the results and submission to the ASFAP

WHERE DO WE STAND?

- Physics Department, Marien Ngouabi University (Brazzaville, Congo)
- Lasers Atoms Laboratory, Cheikh Anta Diop University (Dakar, Senegal)
- Atomic Molecular Spectroscopy and Applications Laboratory, University of Tunis El Manar (Tunisia)
- Medical University of Southern Africa (South Africa)
- African Laser Atomic Molecular and Optical Science Network

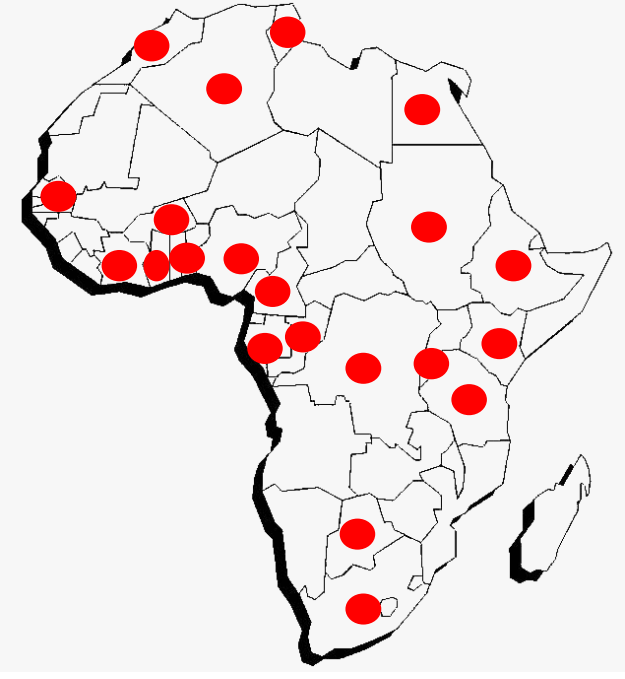
FEATURES

Nuclear, atomic and molecular physics and sustainable development: an issue within CEPAMOQ

M.G. Kwato Njock,
Centre for Atomic Molecular Physics and Quantum Optics,
Faculty of Science, University of Douala, Douala, Cameroon

The perception of the relationship between scientific research and sustainable development in Cameroon is determined by a number of misconceptions and prejudices. The idea of development itself in our collective representations refers almost exclusively to economic data. In this context, to talk about nuclear, atomic and molecular physics and sustainable development is surprising, all the more given that the former suffers from a negative perception associated with the military use of nuclear energy. Above all, it is perceived as an academic discipline or an exclusively theoretical research topic influenced by fashion. It is argued that our technological and structural weakness, make it difficult to render this type of research applicable, which in addition is considered as essentially cut off from our real concerns and unable to

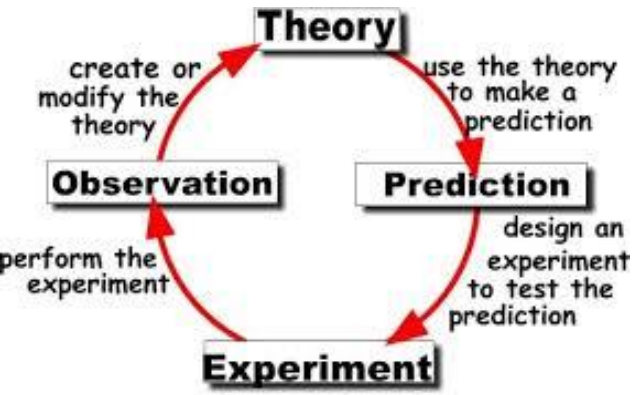
Europhysics news, 02/2004

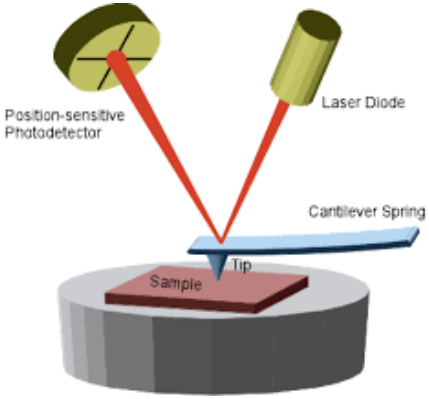


- Scientists (in and out of Africa)
- Politicians (ministers, law makers…)
- Science Diplomats
- Industrials
- Health managers
- Scientific networks: ASESMA, CASESMA, LAAMPS, LAM, AfPS, AfPS, ASP…

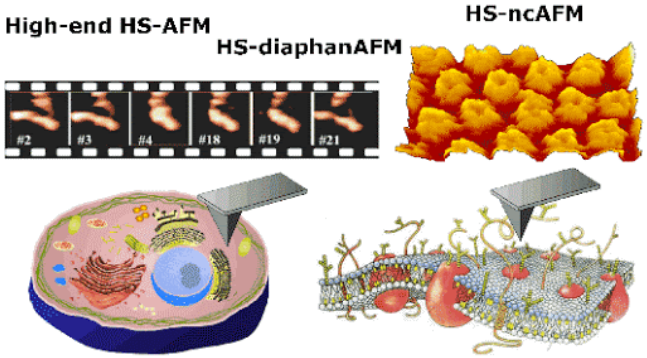
EXPERIMENT: INTERDISCIPLANARITY & THEORY INPUT TO OPTIMIZE MATERIAL SCREENING AND RATIONAL DESIGN

Probing matter at the atomic scale





Atomic Force Microscope (AFM)



Structure of living cells from AFM

More SPM in Africa: STM, SPE
Light sources (LAAMPS)

THE AFRICAN PHYSICS NEWSLETTER

When Women Build Bridges

Stéphane Kenmoe

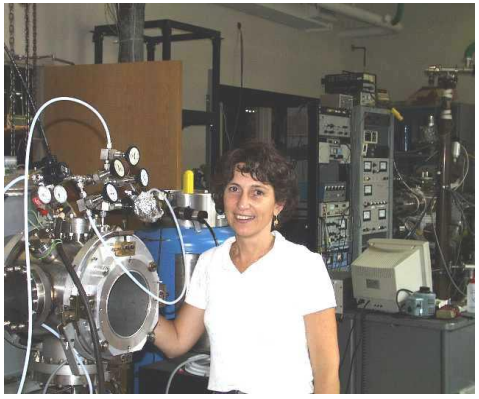
In the last issue of the African Physics Newsletter, Dr. Maryse Nkoua of the Nanomaterials and Nanotechnology Research Unit at the Marien Ngouabi University described the struggle to complete the establishment of a laboratory at the university and the National Institute for Research in Exact and Natural Sciences located in Brazzaville, Republic of Congo. Following this article, which was relayed by the online news site Africscitech [1], two important personalities reacted positively.

Figure 1: Dr. Maryse Nkoua

© International Center for Theoretical Physics (ICTP)

Figure 2: Dr. Raissa Malu

© Next Einstein Forum

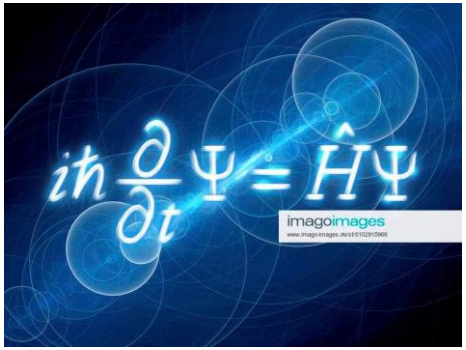


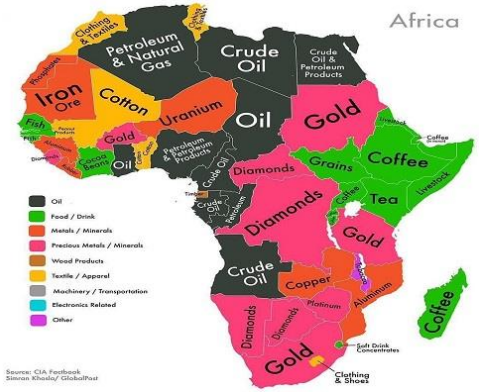
Loredana Casalis, Elletra,Trieste Italy

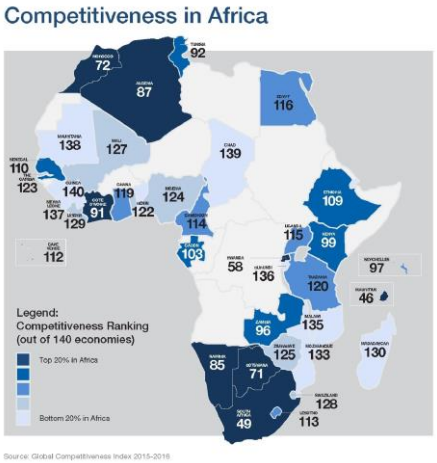
Maryse Nkoua setting an experiment with AFM

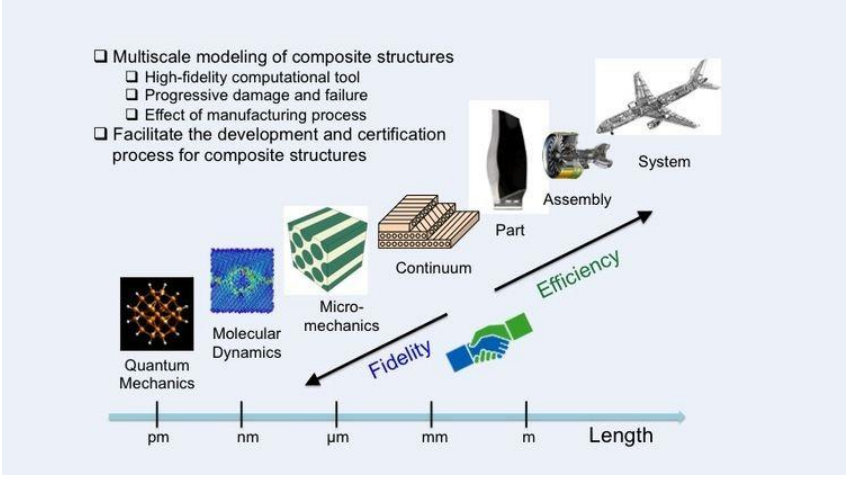
Francine Ntumi, biologist From Congo Republic

THEORY: WHICH SCHRODINGER EQUATION FOR AFRICA ?









Multiscale modelling

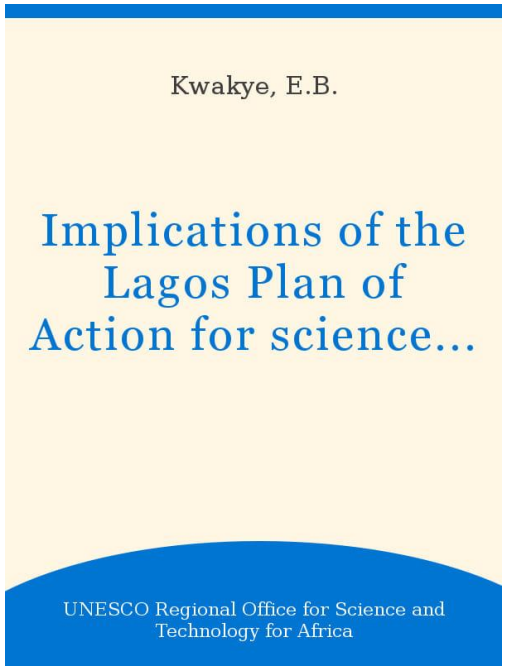
High performance computing

Resources

ICTP, South Africa, Egypt, Morocco Tunisia, Algeria Ivory Coast, Rwanda?

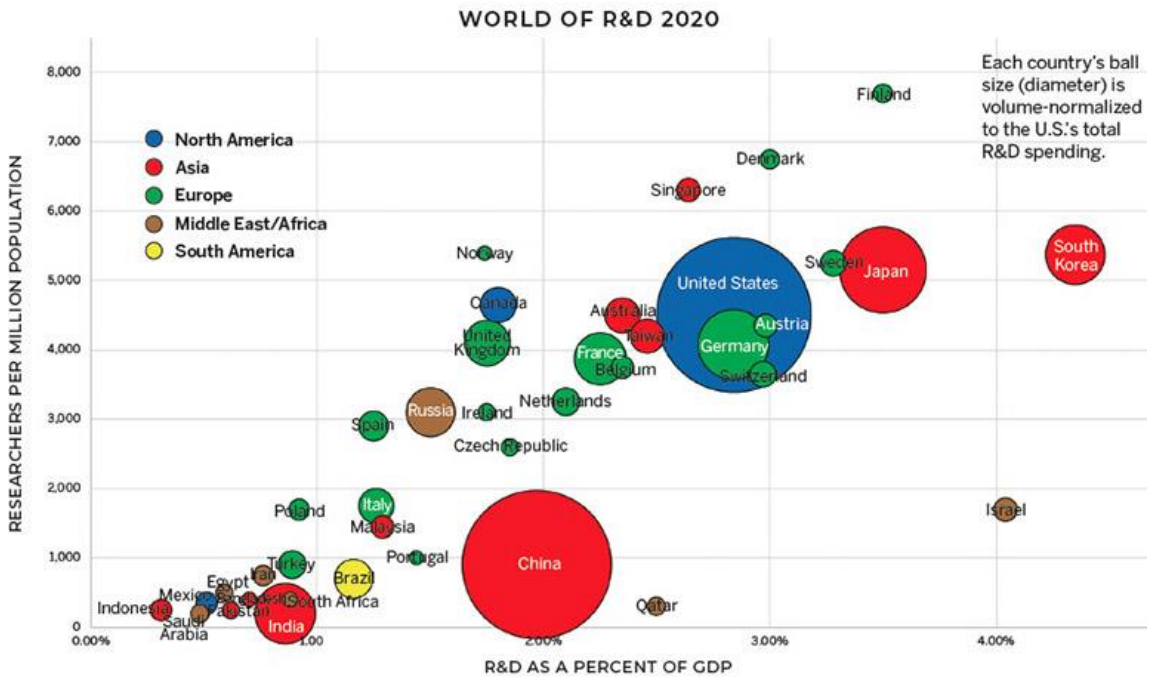
DECISION MAKERS

LAGOS, NIGERIA 1980



1% GDP to R&D

200 scientists / million inha.
vs.
1500 in average in the world



R&D World magazine 61th annual global R&D funding forecast

Big gap between Maghreb and SA

ASFAP

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