# ASFAP Biophysics WG

## Conveners

Dr Emmanuel Nji
(Biostruct Africa)

Prof. Elsie Effah Kaufmann
(U. Ghana)

Prof. Tjaart Krüger
(U. Pretoria)

## Observer

Dr Lawrence Norris

**Speaker: Tjaart Krüger**

ASFAP Community Town Hall Meeting, 12-15 July 2021

# What is Biophysics?

- Biophysics is an interdisciplinary field that applies the principles and methods of physics to understand how biological systems work.
- It is the place where physics, biology, and often also chemistry merge.
- Biophysicists study physical phenomena and physical processes in living matter, from molecules, cells, tissues, and organisms to the properties and behaviour of populations.

# Current status of Biophysics in Africa

- Limited critical mass
- Limited instrumentation
- (Limited funding)
- Limited awareness
- Limited education

# Limited critical mass

# Limited instrumentation

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Scientific Research and Essays

*Full Length Research Paper*

## Slow translation of Tropical Africa's wealth in medicinal plants into the clinic: Current biomolecular infrastructural capacity and gaps in sub-Saharan universities

**Pakoyo Fadhiru Kamba*, Edson Ireeta Munanura, Bruhan Kaggwa, Stephen Lutoti, Herbert Bush Aguma and Richard Odoi Adome**

Department of Pharmacy, College of Health Sciences, Makerere University, P. O. Box 7072, Kampala, Uganda.

**"The purchase cost of most biomolecular research equipment is between USD 30,000 and USD 500,000. ... the cost of establishing comprehensive biomolecular research infrastructure in at least one university per sub-Saharan nation is negligible relative to their gross domestic products (GDPs)."**

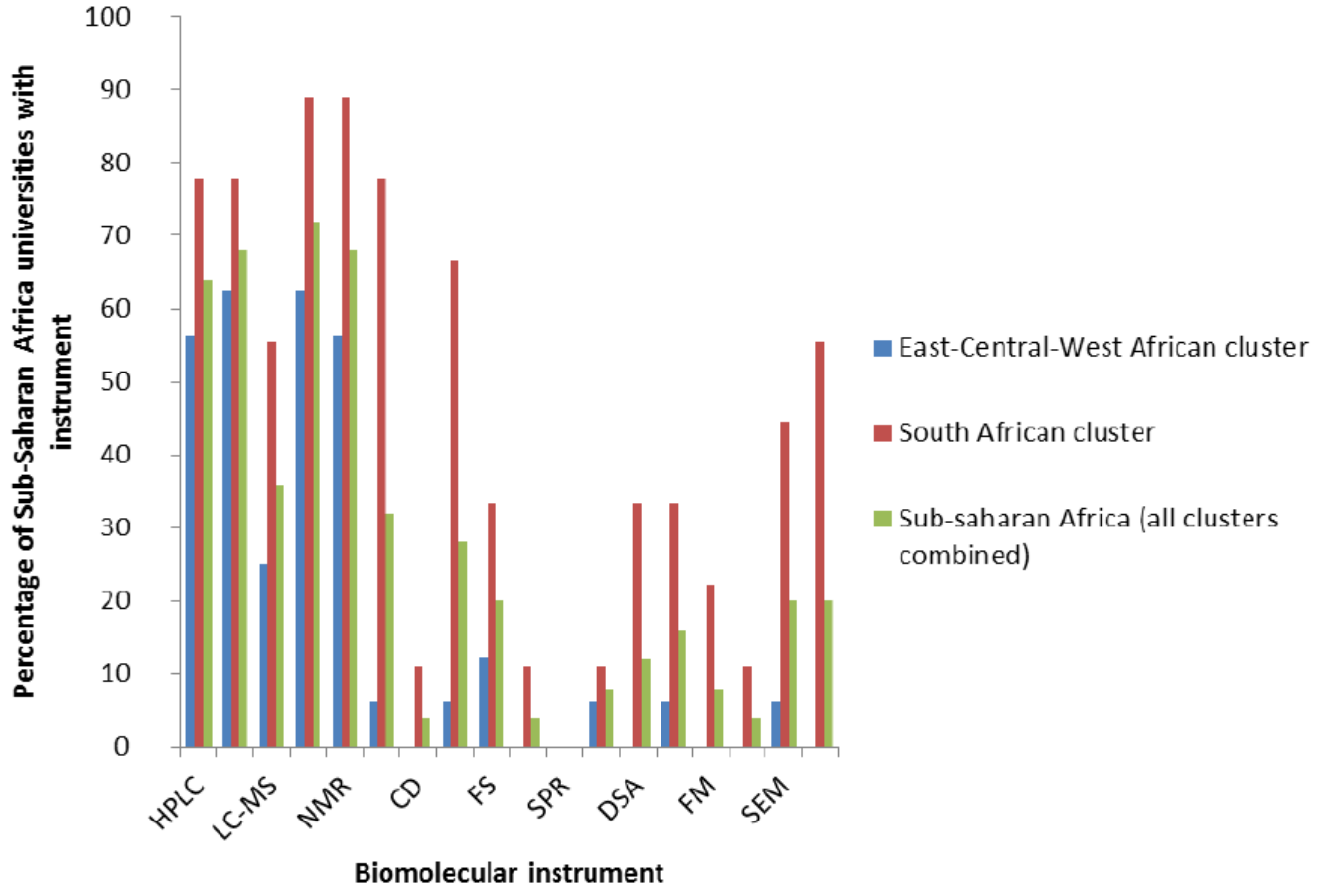


**Figure 3**. Biomolecular instrumental capabilities in 25 Sub-Saharan Africa universities disaggregated into the East-Central-West African cluster (n = 16) and the South African cluster (n = 9).

# Limited awareness

IOP PUBLISHING PHYSICAL BIOLOGY

Phys. Biol. **10** (2013) 040201 (2pp) doi:10.1088/1478-3975/10/4/040201

**EDITORIAL**

# We need theoretical physics approaches to study living systems

**Krastan B Blagoev**
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Living systems, as created initially by the transition from assemblies of large molecules to self-reproducing information-rich cells, have for centuries been studied via the empirical toolkit of biology. This has been a highly successful enterprise, bringing us from the vague non-scientific notions of vitalism to the modern appreciation of the biophysical and biochemical bases of life. Yet, the truly mind-boggling complexity of even the simplest self-sufficient cells, let alone the emergence of multicellular organisms, of brain and consciousness, and to ecological communities and human civilizations, calls out for a complementary approach.

In this editorial, we propose that theoretical physics can play an essential role in making sense of living matter. When faced with a highly complex system, a physicist builds

# Limited awareness

EDITORIAL

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## An eye on biophysics

imaging techniques for biomolecules. But in the modern era of molecular biology, understanding not just individual structures but dynamics and collective phenomena in out-of-equilibrium systems are at issue. Physicists are recognizing the challenge, and rising to it.

Biophysics is firmly part of the remit of *Nature Physics*. But, as a journal for physicists, our interests are necessarily in those areas where physics is genuinely explored; less so in, say, the application of physics techniques. The increasing sophistication of imaging methods was clear at the March Meeting. Infrared spectroscopy, NMR, and picosecond X-ray crystallography using a pump–probe setup at synchrotron sources — all are contributing to our understanding of biology. But in other areas of biophysics, there is a need for physical insight. Indeed, in one of the final sessions of the meeting, 'Synchrony and complexity in brain activity and function', neurobiologist Steven Schiff (George Mason Univ.) made a straight appeal to his physics audience for help in making sense of the data.

# (Provisional) structure of the Biophysics WG

# Biophysics in Africa

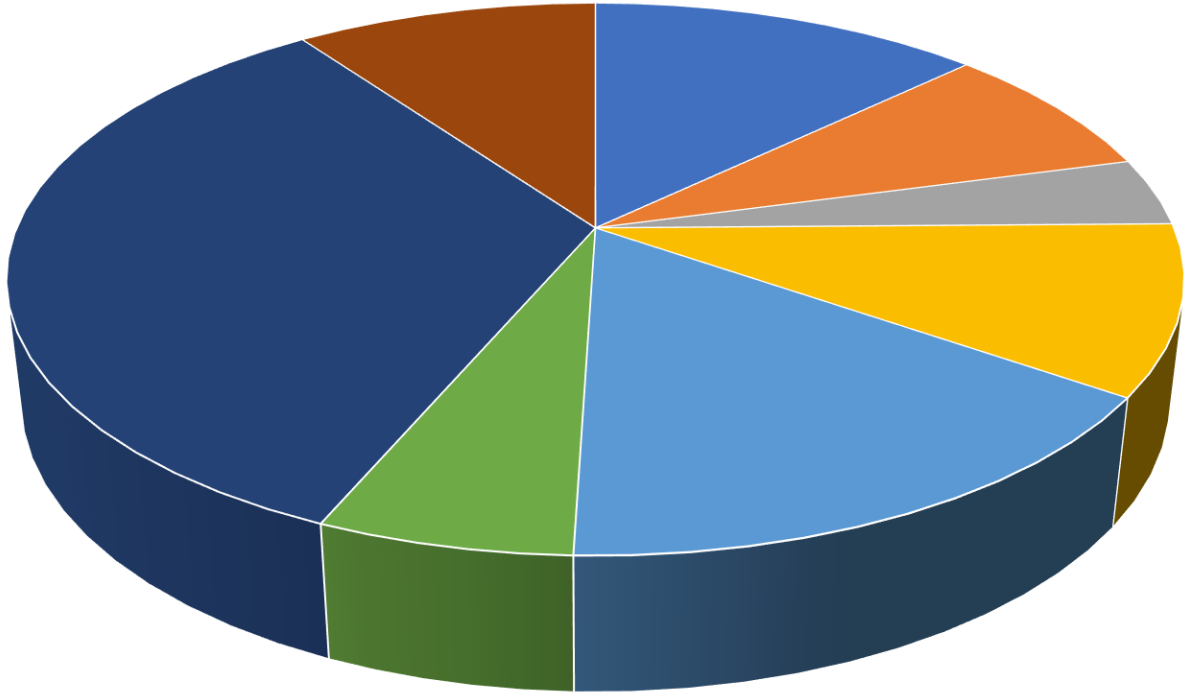
## ZOOM Conference

22-26 March 2021

AfPS

BiophysicsWeek
March 22–26, 2021

## Conference topics



- Biophotonics
- Biophysics and maternal health
- Cellular biophysics
- Computational biology
- Molecular biophysics
- Quantum biology
- Structural biology
- X-ray scattering, spectroscopy and radiation in biophysics (incl radiology)

# (Provisional) structure of the Biophysics WG

Two subgroups

1. Structural Biology
2. The rest

# Strategy of the Biophysics WG

- Create awareness opportunities amongst students and researchers
- Train the next generation of biophysicists:
  - Organise specialised schools and workshops
  - Establish CoEs in targeted areas
  - Develop a Structural Biology Master's programme
  - Long-term strategy: develop (undergraduate) curricula

- Liaise with the Light Sources WG, Medical Physics WG and Optics and Photonics WG.