Glasgow University ▪ Chair of Biomedical Engineering, School of Engineering ▪ G12 8LT Glasgow

AFRICAN STRATEGY FOR FUNDAMENTAL AND APPLIED PHYSICS

Prof. Dr. Thomas Franke
School of Engineering
Chair of Biomedical Engineering
Oakfield Avenue
G12 8LT Glasgow
Phone +44 (0)141-330-2466
Thomas.Franke@glasgow.ac.uk
http://www.gla.ac.uk/schools/engineering/

Dr. Raymond Sparrow
Scientific Network Liaison Officer
raymond.sparrow@glasgow.ac.uk

29.11.2021

We wish to offer my support to the African Strategy for Fundamental and Applied Physics (ASFAP), in particular the Biophysics Working Group.

Biophysics: bringing the disciplines and concepts of biology and physics together in a unique manner which can be applied across physical dimensions from the macro to the molecular and atomic level and timescales from centuries to attoseconds. One can gain an understanding of how energy flows through vast complex systems to obtaining information and manipulate entities on the molecular and atomic levels. As such this is an extremely powerful scientific platform which can address many of the critical challenges that face humanity today and in the future. To undertake this work requires highly skilled individuals collaborating across the globe. These individuals, skills and collaborations need to be identified and fostered.

Africa is a fundamental player in this endeavour with a vast, as yet, relatively un-tapped resource of human capital that needs to be mobilised. This initiative is a critical element in this process and Africa is on the brink of a renaissance which must be encouraged and allowed to grow.

Examples of the Grand Challenges that biophysics can address are in:

- Health, medical
- Environmental management (pollution / climate change)
- Energy security
- Food security
- Telecommunications / computing

The areas that I would consider to be essential to continue to support and develop are:

- The interactions between laser physics and biology towards developing new imaging and manipulation techniques such as the super-resolution and multi-modal microscopies.
- Synthetic biology and micro-fluidics for the development of new technologies for making new materials and products and manufacturing processes that are more environmentally friendly than currently used.
- Quantum biology in the spheres of communications, computing and security.
- Structural biology (such as the development of an African Synchrotron Light Source)

Coupled to Capital equipment and infrastructure developments is the need to develop the skills / educational / training programmes to support the science. These programmes would need to be established as a pipeline in developing curricula along both academic and vocational lines.

Dr. Sparrow was privileged to have been involved with assisting in developing biophysics in South Africa (2005 – 2013) when he relocated from the UK to work at the CSIR in Pretoria. This has included founding Synthetic Biology as an Emerging Research Area (ERA) and as the first Chair of the Biophysics Initiative under the South African Institute of Physics and Department of Science and Technology (2009 – 2012). As such he has a good understanding of the facilities and infrastructure already present in South Africa. There is a very good base here to work from and can be used as a model for growth in other African countries.

I would encourage the establishment and development of Leadership programmes to identify and support young researchers and entrepreneurs.

There is a global emphasis on developing the bio-economy. The UK[1], EU[2] and USA[3] have all formulated strategies to move away from the traditional industrial base and develop a strong bio-economy. Within this, for example it is believed that the synthetic biology market will grow ten-fold by 2030 (Clarke – Chair Synthetic Biology Leadership Council[1]).

Biophysics underpins very large sections of the bio-economy and therefore a strong and diverse biophysics research and commercial sector is vital for the success of the African economy.

Yours faithfully,

Dr. Raymond sparrow

Prof. Dr. Thomas Franke

1. Growing the Bioeconomy. Improving lives and strengthening our economy: A national bioeconomy strategy to 2030. HM Government, UK (2018)

2. A sustainable bioeconomy for Europe: strengthening the connection between economy, society and the environment. *Updated Bioeconomy Strategy*. EC (2018)

3. National Bioeconomy Blueprint. The White House, Washington, USA (2012)