



**African Union
Kwame Nkrumah
Scientific Awards**



**Laureates for the
Continental Awards**

2014 Edition

**DEPARTMENT OF HUMAN RESOURCES,
SCIENCE AND TECHNOLOGY
AFRICAN UNION COMMISSION**

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African Union Kwame Nkrumah Scientific Awards

The African Union Commission launched on 9 September 2008, the prestigious African Union Kwame Nkrumah Scientific Awards Programme.

The objective of the programme is to give out scientific awards to top African scientists for their scientific achievements and valuable discoveries and findings. The programme is implemented at national level for young researchers, regional level for women scientists and continental level open to all scientists. The Continental level is the highest and level of the programme. Prizes are awarded to top African scientists in each of the following two sectors (a) Life and Earth Sciences; and (b) Basic Science, Technology and Innovation at the national, regional and continental levels. The African Union Kwame Nkrumah Scientific Awards Programme is implemented using a set of rules of procedure.

This is one of the holistic and deliberate measures taken by the Commission to maintain science and technology on top of Africa's development, cooperation and political agenda. The Commission calls upon Member States, Regional Economic Communities and other key stakeholders to popularize science among African citizens, empower them, celebrate their achievements and promote all efforts to transform scientific research into Africa's sustainable development.

The Commission implements the continental component of the programme and convenes a jury meeting in collaboration with the African Academy of Sciences to determine diligently two winners per year for this prestigious scientific award, comprising of a Cash Prize of USD 100,000, a Medal and a Certificate.

For the 2014 Edition, the two successful laureates are Professor Salim S Abdool Karim from South Africa receiving the award in the Life and Earth Sciences category, and Professor Kofané Timoléon Crépin from Cameroon, for the Basic Science, Technology and Innovation category.

This brochure gives brief biographies of these African Scientists for their scientific achievements, valuable discoveries and findings.

Laureate of Life and Earth Sciences Award



Professor Salim S Abdool Karim

Professor Salim S Abdool Karim, MBChB, MMed, MS (Epi), FFPHM, DipData, PhD, DSc (honoris causa) is a South African clinical infectious diseases epidemiologist whose research focuses on HIV prevention and treatment. He is the Director of the Centre for the AIDS Programme of Research in South Africa (CAPRISA). He is also Pro Vice-Chancellor (Research) at the University of KwaZulu-Natal in Durban, Professor of Clinical Epidemiology at Columbia University and Adjunct Professor of Medicine at Cornell University, New York. He is an Associate of the Ragon Institute of Massachusetts General Hospital (MGH), Massachusetts Institute of Technology (MIT) and Harvard University. He is Director of the UNAIDS Collaborating Centre for HIV Research and Policy, a status conferred on CAPRISA in 2005. He is the Chair of the UNAIDS Scientific Expert Panel, Scientific Advisor to the Director of UNAIDS and Spokesperson for UNAIDS on scientific matters.

Professor Abdool Karim's scientific contributions include over 250 peer-reviewed journal articles, including several publications in high impact journals such as Science, Nature, New England Journal of Medicine, and Lancet. He is co-editor of the epidemiology textbook (Oxford University Press) and the book on HIV/AIDS in South Africa (Cambridge University Press) that are prescribed texts in medical schools in South Africa.

He is widely recognized for his scientific contributions to HIV prevention, especially for the CAPRISA 004 tenofovir gel trial which showed that tenofovir gel reduced HIV and HSV-2 acquisition. In the field of HIV vaccines, he is co-inventor on two patents which are part of HIV vaccine candidates and he conducted the first

HIV vaccine trial in South Africa (HVTN 040). More recently, the CAPRISA HIV pathogenesis studies have generated important new findings, including the recent discovery of how glycan positions on the viral envelope can lead to the development of broadly neutralizing antibodies. A few months ago, the team demonstrated how a patient (known as CAPRISA 256) generated a highly potent broadly neutralizing antibody targeting the V2 region, a finding now being pursued for passive immunization as a prelude to future vaccine development.

His research and detailed analysis of both the HIV and TB epidemics in South Africa had a marked influence on South Africa's new post-denial approach to these epidemics. At global level, the CAPRISA 003 trial on TB-HIV treatment redefined the WHO guidelines on treatment of TB-HIV co-infection and its findings have already been implemented in several countries. On World AIDS Day in 2009, the South African government announced a change in TB-HIV co-treatment guidelines, drawing on this trial's effective strategy for saving thousands of lives through the successful implementation of antiretroviral therapy for TB-HIV co-infected patients.

His research contributions have been recognized nationally and internationally through several awards including the DIA - Drug Information Association's "President's Award for Outstanding Achievement in World Health", the African Academy of Science's "Olusegun Obasanjo Prize for Scientific Discovery and Technological Innovation", the South African National Science & Technology Forum's "Research leading to Innovation" Award, "Gold Medal Award for Fellowship in the Art & Science of Medicine" from the South African Medical Association, Columbia University's "Allan Rosenfield Alumni Award", the N'Galy-Mann Award (with Quarraisha Abdool Karim) for contributions to AIDS research, the "Science for Society Gold Medal Award" from the Academy of Science in South Africa, "2011 Outstanding Senior African Scientist Award" from the European Union – Developing Countries Partnership, and "TWAS Prize in Medical Sciences". Most recently, he was awarded the John F. W. Herschel Medal from the Royal Society of South Africa, the 2013 Distinguished Scholar Award from the Biomedical HIV Prevention Forum of Nigeria and the US Science and Technology Pioneers Prize (awarded to the CAPRISA 004 team) from US Agency for International Development. In June 2014, he was conferred with an Honorary Doctorate (DSc) in Medicine by the University of Cape Town.

He is a member of the Academy of Science of South Africa, Royal Society for Science in South Africa, African Academy of Sciences and The World Academy of Sciences (TWAS). He is a Foreign Associate of the Institute of Medicine of the US National Academy of Science and a member of the American Academy of Microbiology.

Laureate of Basic Science, Technology and Innovation Award



Professor Kofané Timoléon Crépin

Born on 4 August 1956 in Edéa, Cameroon, Kofané Timoléon Crépin is professor of physics at the University of Yaoundé I. He completed his PhD at the University of Bourgogne, France. In October 1988, he returned to Cameroon and began to teach physics at the University of Yaoundé and has since then created a successful nonlinear dynamics and chaos group. His research touches on subjects ranging from nonlinear excitations and coherent structures such as soliton theory to dynamical systems and chaos.

He is, with Dr A. M. Dikande, the originators of the well known parameterized double-well potential which is extensively used in phase transitions in quantum tunnelling. He has pioneered a Hamiltonian which describes the spin dynamics of ferromagnets subject to easy-plane anisotropy and a parameterized Zeeman energy. In recent years, mathematical and physical contributions to the flight of neurological sciences have improved our understanding of neuronal behaviour. This is because the conditions under which cortical waves occur are very primordial in the understanding of the normal processing of sensory stimuli as well as pathological forms of behaviour, such as epileptic seizure, migraines, Parkinson diseases and others. The Hindmarsh-Rose complex dynamical system is a well-known model of a single neuron. Deterministic, stochastic bifurcations and stability of the synchronized network of Hindmarsh-Rose neuronal models have been well explored.

Another, more recent aspect, has involved the study of the physical properties of DNA. Denaturation is one of the intimate DNA physical features that are supposed to be involved in many critical cellular functions, such as transcription, replication and protein binding, but are not fully understood. We have

studied the nonlinear dynamics of DNA on some mathematical models to show that DNA can be studied through modulational instability and energy localisation. Attention has been paid to the impact of viscosity, helicity and cooperation on pattern formation and energy localization in DNA. Since 2008, I began to study what is called now a “Bose-Einstein condensate”. These condensates have fascinating properties that we try to understand and they could have very interesting new applications like “atom lasers”, analogous to usual lasers, where optical waves would be replaced by matter waves.

The concept of soliton control is an important development in the application of solitons. We have proposed the most generalized inhomogeneous coupled nonlinear Schrödinger-Maxwell-Bloch and coupled Hirota-Maxwell-Bloch systems and analyzed for the solitary wave propagation. In some cases, the nonlinear Schrödinger equation cannot constitute an adequate system for describing ultra-short pulses. In order to capture the complex optical phenomena that cannot be explained by the cubic nonlinear Schrödinger equation, a considerable amount of research efforts has been made. For instance, the Schäfer-Wayne short-pulse equation has been derived. We have introduced the vector form of the Schäfer-Wayne short-pulse equation.

He was Co-Director with T. Dauxois, M. Marsili and M. Müller of the “International School on Nonlinear Dynamics in Complex Systems”, held at the University of Yaounde I, from 31 October 2011 to November 2011. This course that was attended by 115 participants from Africa, Europe, Asia and America was organized by ICTP, Trieste (Italy).

Since 1988, I had published more than 300 scientific publications, four book chapters and more than 50 communications. Also, he supervised 43 PhD, 100 Master’s degrees and DEA.

He is serving on the TWAS Independent Expert Committee (IEC) for review of TWAS Prize candidates in the field of Physics for the three year-period 2013-2015. Member of the African Academy of Sciences (AAS) Advisory Committee on Mathematical sciences, Informatics, Physics and Astronomy. He is also Member of the Academy of Sciences for Developing World (TWAS)(2010), Member of the African Academy of Sciences (AAS)(2007), Member of the Cameroon Academy of Sciences (CAS)(2006), Senior Associate membership at the Abdus Salam International Centre for Theoretical Physics (2002-2008) and (2011-2016) in the Condensed Matter and Statistical Physics Section. In 2007, he became one of the International Board of Editors of the African Physical Review.



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