Paul Woafo's contribution to the enhancement of physics in developing countries

Winner of the 2020 IUPAP C13 Physics for development medal

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(See IUPAP Newsletter June 20,2020: page 5)

PLAN

1. Presentation of the laureate

2. Supervision of PhD thesis and follow-up of PhD holders

3. Creation, management of the Cameroon Physical Society and student chapters

4. Promotion of physics and applications through specialized booklets

5. Creation of Sci-Tech Services

6. Acknowledgments and hopes

1. Presentation of the laureate

- Born on January 12, 1965 in Cameroon.
- All the school education in Cameroon from the primary level to the doctorate level,
- Doctorat 3ème cycle" in 1992 (8 years university studies)
- "Doctorat d'Etat" in 1997 (about 5 years for lecturers and researchers: condition before being promoted to associate professor)
- The two doctorates on short topological solitons dynamics in solid-state materials and biological long chains molecules (DNA).
- Recruited assistant lecturer at the University of Yaoundé in 1992, then promotion to different academic ranks culminating to the rank of full Professor in 2005
- Orientation to a new research topic after the Doctorat d'Etat in 1997: Nonlinear oscillations and chaos (looking for a topic where experiments can be conducted locally with limited means).
- Presently author of 259 articles in outstanding physics and engineering

2. Supervision of PhD thesis and follow-up of PhD holders

❖ Supervision of PhD thesis :

- 1992: Less than 5 PhD thesis in Physics defended in Cameroon,

- Opening of 5 new universities in Cameroon in 1993: lack of lecturers
- Lucky to be put on the follow-up of Master thesis and PhD thesis by Prof, KOFANÉ and BOKOSAH (our former PhD supervisors)
- First trip out of Cameroon at ICTP in 1994: several research topics obtained after going through the large list of physics journals, Back: distribution to colleagues and necessity to work with Master and PhD students,
- Since then: more than 60 per cent of my time is devoted to the supervision of Master and PhD students
- Supervision of 57 PhD thesis in Cameroon and abroad.

- Most of them in public universities and research institutes in Cameroon and abroad with full professor level and Director of research level.

❖ Science collaborations with colleagues abroad for postdocs and research stays

In Africa: Benin, Nigeria, and South Africa

In Europe: Belgium, France, Germany, Italy, Norway, and Spain

In America: Brazil, Canada, and United States

In Asia: India and Japan

3. Creation and management of the Cameroon Physical Society

- After a period of discussions, I convened a meeting for the Creation of the Cameroon Physical Society in 2006. 6 physicists from 3 universities responded to the invitation. The society was created and obtained the government approval in 2007.
- Management as the president from 2006 to 2013.
- First conference in 2008: state of physics in Cameroon (education and research in all national universities and research institutions),
- Creation of a biannual international conference on Low Cost High Level Physics and Solutions to real life problems. Only permanent meeting in Cameroon for national and foreign physicists. 7th edition next December 2021.

- About 150 members.

Web site: www.scp-web.org

3. Creation and management of the Cameroon Physical society

Creation of Students chapters

- Creation of three Students chapters for the promotion of optics and embedded technologies education in secondary and university schools:
  OSA-CPS Student chapter, SPIE-CPS student chapter, IEEE-CPS students chapter.

- Several activities conducted:

Special trainings to empower graduate students and postdocs, not only in the main field of optics and applications, but also on embedded technologies, on numerical simulation and on career development.

Special trainings in favor of women scientists: Women in photonics meeting.

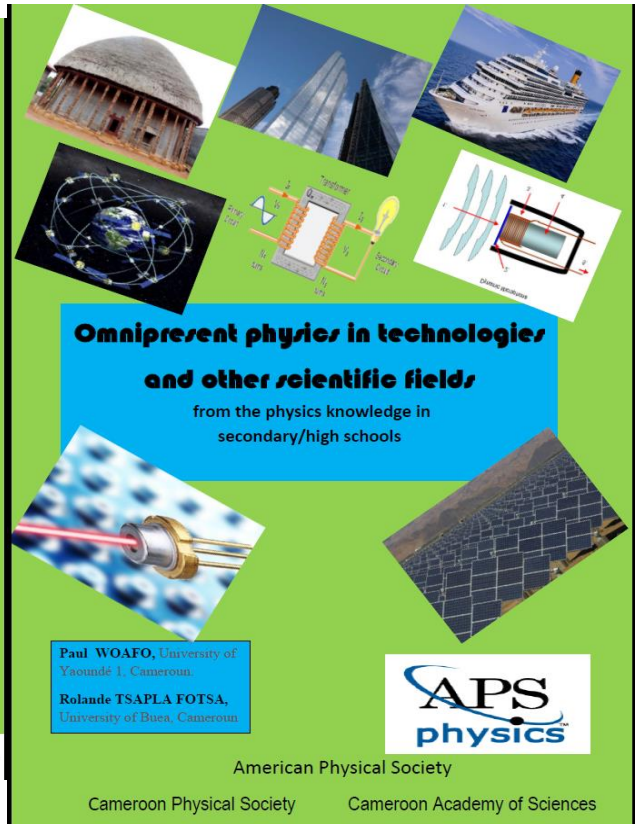
Promotion of optics to children in primary and secondary schools.

Participation to the creation of the African Physical Society

- Participation to the creation of the African Physical Society: First meeting at Cape Town in 2008 with IOP-UK (association of national physics society or association open to individual physicists). Second meeting at Dakar in 2010 (creation with vice presidents representing different African regions).

4. Promotion of physics through specialized booklets

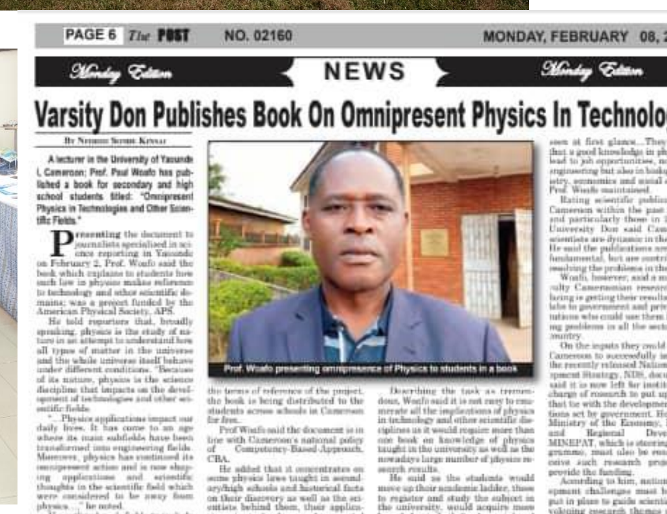
- **“Production and applications of light”** sponsored by SPIE for the IDL 2019
- **“Methods for the production of electricity”** sponsored by SPIE for the IDL 2021
- **“Omnipresent physics in technologies and other scientific fields”** sponsored by APS in 2020










PAGE 6 The POST NO. 02160 MONDAY, FEBRUARY 08, 202

Monday Edition NEWS Monday Edition

Varsity Don Publishes Book On Omnipresent Physics In Technologi

A lecturer in the University of Yaounde I, Cameroon; Prof. Paul Woafo has published a book for secondary and high school students titled: "Omnipresent Physics in Technologies and Other Scientific Fields."

Presenting the document to journalists specialised in science reporting in Yaounde on February 2, Prof. Woafo said the book which explains to students how each law in physics makes reference to technology and other scientific domains; was a project funded by the American Physical Society, APS.

He told reporters that, broadly speaking, physics is the study of nature in an attempt to understand how all types of matter in the universe and the whole universe itself behave under different conditions. "Because of its nature, physics is the science discipline that impacts on the development of technologies and other scientific fields.

"...Physics applications impact our daily lives. It has come to an age where its main subfields have been transformed into engineering fields. Moreover, physics has continued its omnipresent action and is now shaping applications and scientific thoughts in the scientific field which were considered to be away from physics..." he noted.

He outlined such fields to include

Prof. Woafo presenting omnipresence of Physics to students in a book

the terms of reference of the project, the book is being distributed to the students across schools in Cameroon for free.

Prof Woafo said the document is in line with Cameroon's national policy of Competency-Based Approach, CBA.

He added that it concentrates on some physics laws taught in secondary/high schools and historical facts on their discovery as well as the scientists behind them, their applications in technology and a special

Describing the task as tremendous, Woafo said it is not easy to enumerate all the implications of physics in technology and other scientific disciplines as it would require more than one book on knowledge of physics taught in the university as well as the nowadays large number of physics research results.

He said as the students would move up their academic ladder, those to register and study the subject in the university, would acquire more knowledge in both fundamental and

5. Creation of Sci-Tech Services

- Severe lack of experimental training in high schools and universities, even in engineering schools,
- Very limited experimental work in physics research.

- When possible: a group of more than 5 students in the same equipment at the same time.

Reasons: no sufficient fund to equip the laboratories and high number of students..

Consequences: a chain of physicists unable to carry out experiments, including school teachers and universities lecturers.

What to do at the personal level?

From personal savings: Creation of Sci-Tech Services in 2013 (www.sci-tech-services.com)

- Promotion of experimental science,
- Reinforcement of practical trainings,
- Presentation of physics lectures with video showing the related experimental activity,
- Some kinds of research for development for problems encountered locally.

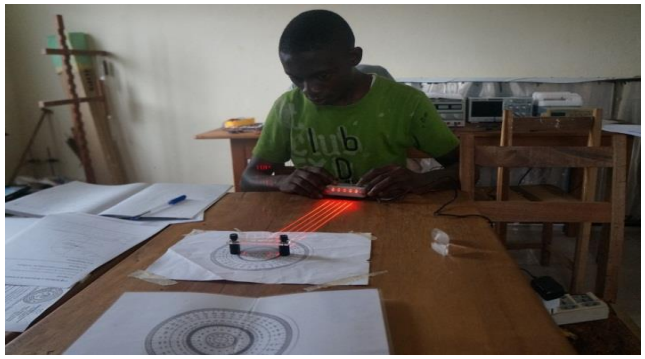
Users:

- Single students or groups of students,
- Single students or groups of students,
- Specialized practical training for Master and PhD students,
- Local support of the APSA experimental physics competition: open to young African physicists and engineers able to devise and fabricate locally equipment

for practical trainings in physics education and research, for solution of development problems.

- Support to national and foreign organizations: a recent example is the Diasporeines Maths and Computer science competition open to high school female students.

5. Creation of Sci-Tech Services



Two university students conducting their experimental physics course at Sci-Tech Services

Some members of the Cameroon IEEE student chapter with their training certificates at the end of a course on microcontrollers programming at Sci-Tech Services.

Some candidates of the APSA experimental physics competition during a training on Arduino programming at Sci-Tech Services.

6. Acknowledgments and hopes

- **The supervision of PhD thesis would not have been possible without support received from ICTP, TWAS and the Humboldt foundation**
- **Colleagues** from different national and foreign scientific institutions,
- **My former PhD students** whose good research activities renders proudness to me.
- **The nominators for this prize**,
- **C13 Commission for awarding the prize**.

Hopes:

Sharp increase of physics students in several African countries.

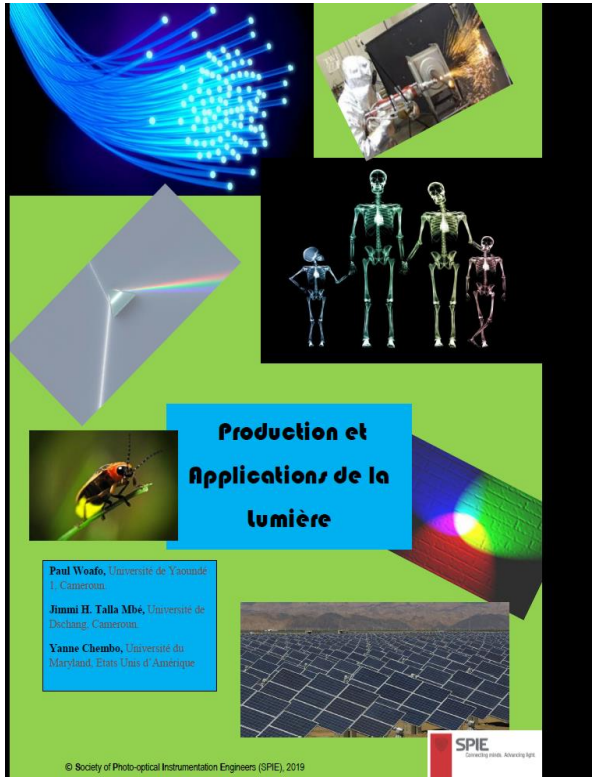
IUPAP could advocate where possible in order to create

- strong links between research groups all over the World and research groups in Africa in order the exploit the potential of these young people in physics.
- Good experimental research facilities in Africa, With the today telecommunication facilities, it is clearly possible and easy today for mutual supervision of research works, even experiments living in separate countries.

4. Promotion of physics through specialized booklets

❖ **Booklet on "Production and applications of light"** sponsored by SPIE for the IDL 2019**:**

- different education and research domains for light, scientific organizations in the field of light
- diverse methods to produce light
- different applications of light (telecommunications, information technologies, industries, medicine, production of electricity and heat, military applications, space applications, art and cultural applications)



-Presentation to students in different universities
-Free distribution of hard copies to students, journalists, general public, Diffusion in media

4. Promotion of physics through specialized booklets

Booklet on "Methods for the production of electricity" sponsored by SPIE for the IDL 2021

Presentation of physical principles behind hydroelectric plants, wind electricity, solar electricity, geothermal and nuclear electricity with physical demonstration for the models for hydroelectricity and wind electricity.

-Presentation to students in different universities

-Free distribution of hard copies to students, journalists, general public, Diffusion in media

4. Promotion of physics through specialized booklets

- **Booklet «Omnipresent physics in technologies and other scientific fields** from the physics knowledge in secondary/high schools » sponsored by APS in 2020

- presentation of some interesting physics laws/phenomena (classical and modern physics), some historical facts on their discovery and on scientists behind them, and their applications in technology and a special point on nowadays omnipresent Information and Communication Technologies;

- Presentation of the breakthrough of physics in other scientific fields (chemistry, biology, astronomy and astrophysics, social sciences and economics).

-Presentation to students in different high schools in different parts of the country

-Free distribution of hard copies to students, journalists, general public, Diffusion in media