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# Challenge

## “Experimental Physics for Africa”

■ **Odette Fokapu Bouquet**<sup>1,2,6</sup>, **Daniel Hennequin**<sup>1</sup>,  
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**Annick Suzor-Weiner**<sup>1,2,4,7</sup>, **Paul Wofo**<sup>1,3,7,8</sup>

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■ <sup>5</sup> Université de Yaoundé I

■ <sup>6</sup> Université Technologique de Compiègne

■ <sup>7</sup> Agence des Universités Francophones

■ <sup>8</sup> Sci-Tech-Services

**In 2017, the Association for the Scientific Promotion of Africa (APSA), in collaboration with Professor Paul Wofo (Yaoundé I University – Cameroon) and the Cameroon Physical Society, organized a competition to reward the development of innovative sustainable cost devices that can be locally produced and used for physics education and research.**

**T**here is about one engineer for 10 000 inhabitants, versus 20 to 50 in industrialized countries. However, experimental sciences play a main role in economic development and societal challenges, such as environment, health, climate change, energy, etc.

### Obstacles to the development of experimental sciences in Africa

One of the main obstacles to the development of experimental sciences is the lack of scientific instruments in high schools and universities. The reason is that scientific instruments are too expensive for low-resources countries. Moreover, their production is essentially located in developed countries, leading to maintenance and consumables issues. But that could change with the new tools and methods from the 3<sup>rd</sup> digital revolution: collaborative networks (Arduino, Raspberry Pi) and working spaces (Fab Labs), open access to scientific literature, open science hardware strategies and innovative technologies since these advances make the design, prototyping, fabrication and programming of sustainable cost instruments much easier and cheaper.



◀ **FIG.1:** Presentation of the awards ceremony (Yaoundé, 8<sup>th</sup> December 2017). First row, left to right: Hyacinthe TCHAKOUNTE (special jury prize), Kevin KENTSA ZANA (first prize), Béranger NYNGA NINI (second prize), Ulrich SIMO DOMGUIA and Raoul THEPI SIEWE (third prize).

TCHAKOUNTE for his Solar tracker (figure 2). The amount of the prizes is high enough to enable the laureates to develop and distribute some prototypes of their instruments and eventually create a small enterprise.

For this first edition of the challenge, 17 projects were submitted, with only two led by women. Due to the difficulties in bringing participants from other countries, it was restricted to Cameroon. In the future this challenge should be organized every two years: we will work to open the next edition to other countries and encourage girls' participation. We hope to find the funding through a strong lobbying on African firms. ■

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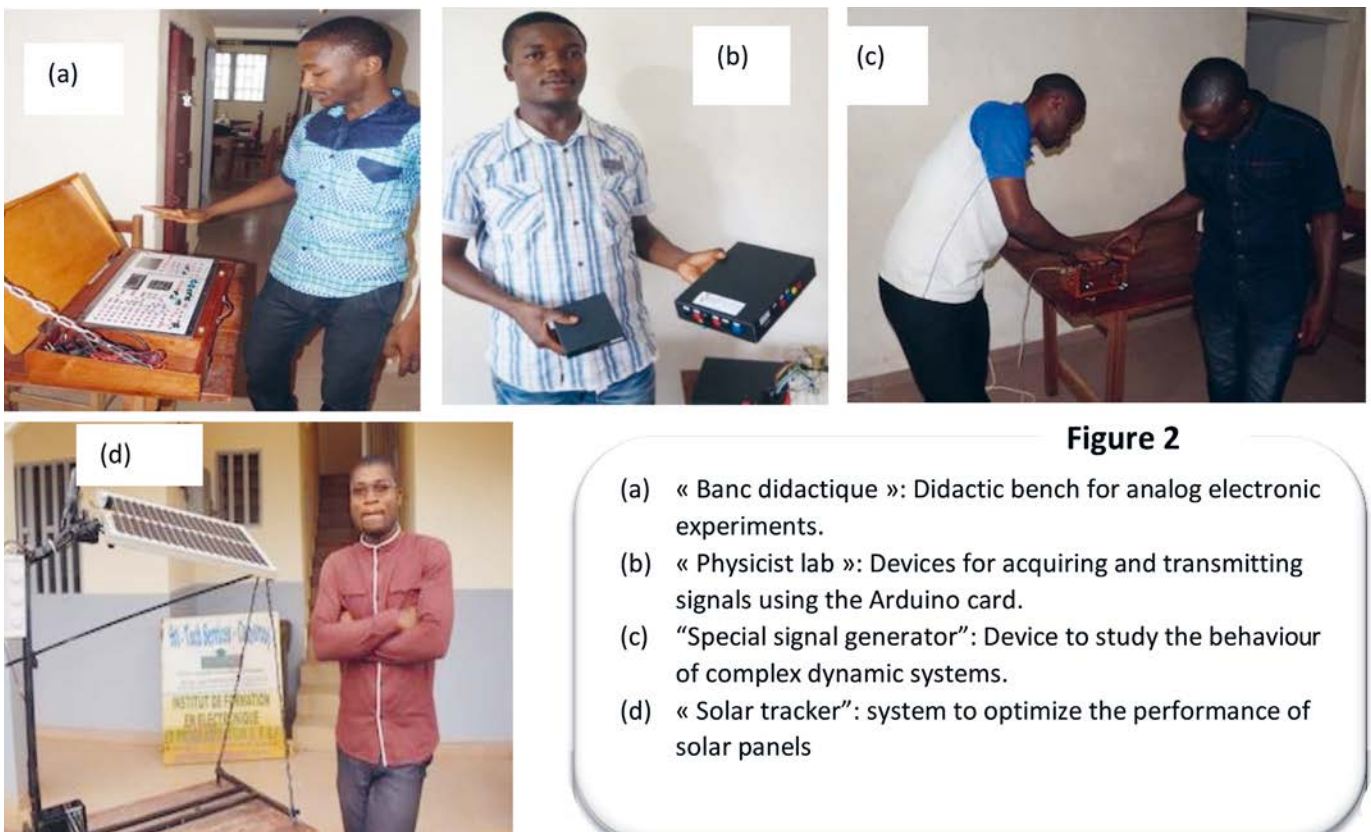
**Cameroon:** Académie des Sciences du Cameroun, Société Camerounaise de Physique, Société Express Union.

### Sustainable cost scientific instrumentation

These observations led us to organize this modest but determined action to find local solutions to tentatively improve the teaching of experimental sciences in secondary level and bachelor level, stimulate the development of locally sustainable cost-effective instrumentation and develop the research in applied sciences in Africa. The challenge was divided into three main stages: (i) selection of the best ten candidates by an international panel, (ii) training

on the Arduino platform with making of a final project evaluated by a local panel, (iii) selection of the best three projects.

The challenge ended on 8 December 2017, with the awards presentation (figure1). The first prize (1500€) was given to Kevin KENTSA ZANA for a didactic test bench, the second prize (1000€) to Béranger NYNGA NINI for his Physicist Lab and the third prize (700 €) to Ulrich SIMO DOMGUIA and Raoul THEPI SIEWE for their special signal generator. A special jury prize was given to Hyacinthe



**Figure 2**

- (a) « Banc didactique »: Didactic bench for analog electronic experiments.
- (b) « Physicist lab »: Devices for acquiring and transmitting signals using the Arduino card.
- (c) “Special signal generator”: Device to study the behaviour of complex dynamic systems.
- (d) « Solar tracker”: system to optimize the performance of solar panels