

Letters of Interest Submission



Contribution ID: 37

Type: **not specified**

Rethinking African experimental physics

Rethinking experimental physics in Africa

More than in other fields of STEM, advancement in experimental physics has relied past decades on technological or material discoveries such as LASERs, the Large Hydron Collider quantum teleportation or graphene. These advancements have cost huge amounts of money and time to accomplish. Many of those experiments necessitate sophisticated lab environments and/or very specialized technicians to maintain and operate the equipment.

The African experimental reality is generally one of less means and a lack of maintenance culture or priority. This is one of the reasons why so much output from the continent relies on simulations.

When a real experiment needs to be done, an African experimentalist would build an experimental plan and book lab space abroad for a determined amount of time. Working like this, there is barely time for a natural scientific process of discovery leading to new scientific questions leading to new discoveries. This is usually the process where the real innovation happens.

We need to rethink experimental physics in Africa. Not by imitating, but by doing things our own way. I offer three suggestions on how to do innovative experimental physics on this continent: (1) Let's be creative using accessible experimental equipment, (2) let's get a sense of urgency back, (3) let's find affordable solutions for local problems in society.

Creativity with experimental equipment

An experiment requires a reliable measurement instrument. Nowadays, a measurement tool can already be a smartphone (there is a camera, a microphone, a magnetometer, a GPS sensor, an antenna...inside). With a creative mind and some clever programming, one can convert such a device into a spectrometer, an EMF detector or a sensor of some kind.

With a slightly larger budget, Ebay offers the next level equipment. Secondhand scientific tools are regularly sold for a fraction of the new price.

Sense of urgency

The biggest accelerators for science in the past decades have been the cold war and the big wars. Examples of what the cold war brought forth are the discoveries caused by the space race and the nuclear proliferation. Both historical events forced the scientific community to prioritize solutions for challenges that did not exist before.

What lacks in Africa is a sense of urgency. Governments and industry can create that sense of urgency by stimulating certain areas of research that target local challenges. The challenges themselves are urgent. Without solutions, some of these challenges (climate change being the greatest) can cause catastrophes with large consequences. Realizing this, the scientific community needs to take the first steps. With excellence. This requires research groups to become more flexible to leave their traditional research topics. This requires the research community to engage more with society to assess these challenges. It asks for a more humble, service-minded approach.

Local solutions for local challenges

Africa has its own particular sets of challenges that ask for specialized solutions. The challenges lie in the areas of agriculture, mining, disease mitigation, industrialization, internet accessibility, climate change, harnessing solar energy, water scarcity etc.

For every challenge, there are numerous solutions. Physics is able to solve many of them, if only physicists would work on these challenges. We should turn our eyes on what is happening around us, instead of being stuck in textbook topics. Finding solutions that help solving real problems is rewarding. Often, it produces new interesting research topics. Local solutions create a passion for science and have relevant impacts on

society. Local physics solutions create an economy where society can profit and advance and physics can be funded locally. Let's use our physics knowledge to improve other areas of research such as biology, agriculture, computing or medicine.

This flexible approach is already being applied by several startups and research groups in Africa. My own Tunisian startup laboratoirelaser.com for example works on local challenges in agriculture by developing photonics innovations.

Primary Category

Optics & Photonics

Secondary Category

Condensed Matter & Materials Physics

Subgroup categories

MaterialsPhysics—Materials for optics

Did you / will you submit this LOI to another category?

NO

Additional Information

This LoI is meant to inspire experimental physics in Africa.

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