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for Theoretical Physics

## Active Learning in Optics and Photonics: Training Physics Trainers

### ALOP Zimbabwe 2018

23-27 July 2018

Applied Physics Department, Faculty of Applied Science, National University of Science and Technology, Ascot, Bulawayo, Zimbabwe

#### Introduction

The UNESCO, international award-winning\*, physics education program entitled “**Active Learning in Optics and Photonics: Training Physics Trainers**” (ALOP) is a five-day, hand-on, minds-on workshop that aims to renew the physics skills and teaching approaches of university academics and high school teachers. The ALOP program introduces participants to an active learning approach that can successfully be used to improve student learning in several optics and photonics topics typically found in both introductory university and final year high school physics courses.

The program is designed using low-cost equipment and techniques that are suitable for physics education in many developing countries. In the ALOP workshop, teachers are trained via carefully designed learning plans that integrate conceptual questions and mentally-engaging hands-on activities. The ALOP program has been prepared by an international group of physics education experts and resource persons who also facilitate the workshop. An extensive ALOP student guide and teacher resource package is distributed to participants of the workshop (ALOP manual). The manual also includes an assessment tool (the light and optics conceptual evaluation test), which has been developed to measure students’ conceptual understanding of optics. This assessment tool can be used both as a pre-test and as a post-test, in order to measure students’ learning gains. The participants in the workshop are offered an opportunity to learn about innovative modes of content delivery and also a chance to improve their conceptual understanding of optics and photonics.

The ALOP program encourages teachers to improve their own teaching of the optics and photonics parts of their introductory physics courses, and to inspire their students to develop a genuine interest in optics and to pursue further studies in the field. Fostering an understanding and appreciation of optics and photonics in high school and at university will lead to better training of scientists, engineers and technicians. ALOP Zimbabwe 2018 is the latest of over 30 UNESCO Workshop on Active Learning in Optics and Photonics, and will be held during 23-27 July 2018.

\* SPIE (*International Society for Optics and Photonics*) Educator Award, 2011.

Presented to the development team of the UNESCO Active Learning in Optics and Photonics (ALOP) program, in recognition of the team’s achievements in bringing basic optics and photonics training to teachers in the developing world.

## Objectives of the workshop

- To promote teaching of optics and photonics (at the introductory university physics and final year high school level) via active learning methods.
- To promote research and development in physics education by using activities designed by education experts to investigate students' understanding of the basic principles of optics.
- To share and compare information about existing teaching practices in the topics of optics and photonics in schools, colleges and universities.

## Workshop program

This ALOP (in Zimbabwe) will follow the award-winning structure developed in earlier ALOP workshops, which focuses on the teaching and learning of:-

- Fundamentals of light and optics
- Scattering, polarization, Atmospheric optics
- Interference, Diffraction
- Optics of the eye
- Photonics and Optical Communication

The workshop is open to the educators of undergraduate introductory physics courses in colleges and universities, and teachers of senior high school physics, in Zimbabwe, and in other countries in the region. The workshop participants **MUST** be engaged in teaching physics to students at senior high school or at first year university, and must be ready to engage in innovative teaching approaches. Preference will be given to those actively engaged in the teaching of Optics or intending to do so. The participants will be expected to play a lead role in implementing an active learning approach in their own institution. A maximum of 30 participants can be accommodated in ALOP Zimbabwe 2018. Women and/or those working in remote places are encouraged to apply.

### **ALOP workshop local coordinator**

Jephias Gwamuri (NUST)

### **ALOP workshop local organizing committee**

Jephias Gwamuri (NUST)

Peter Baricholo (NUST)

Ellen F Maguranyanga (NUST)

Caraster Dambaza (NUST)

Valentine T Chabata (NUST)

### **ALOP Director**

Joe Niemela (ICTP, Italy)

### **UNESCO Liaison**

Juste Jean Paul Ngome Abiaga (UNESCO Paris)

### **ALOP regional coordinator**

Alex Mazzolini (acting on behalf of Souad Lamar)

### **Resource persons**

Souad Lamar

(University of Tunis, Tunisia)

Alex Mazzolini

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