ICTP/UNESCO programs for promoting optics education and research worldwide

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What is ICTP?

A successful model of international collaboration

• A *global* institution for scientific research and education (emphasis developing countries!).

• 120,000 visitors since 1970 from 188 countries

• Founded 1964. Tripartite: Italy+IAEA+UNESCO (85% Italy, 10% IAEA, 1.5%+administration UNESCO)
Salam’s vision: being scientifically active *and* remaining in your home country should *not* be mutually exclusive events

- **Sandwich PhD Program (STEP)**
- **Associates Program**
- **Scientific Activities at ICTP and regionally** (conferences, workshops, schools)
- **Training and Research in Italian laboratories (TRIL)**
- **Office of External Activities (OEA)**

- **ICTP hosts:** TWAS *(1983)*, IAP *(1993)*, OWSD *(2005)*
Office of External Activities

Outreach activities, 2011

- Affiliated Centres (7)
- Projects (9)
- Networks (11)
- Scientific Meetings (67)
Trieste Optical Sciences Advisory Board  (TSOSA)

TSOSA provides support and expert advice to ICTP for its optics programs

The board is composed of representatives of many international optics organizations and societies: EOS, ICO, OSA, OWLS, SIOF, SPIE

In addition, there are representatives of
African LAM Network
UNESCO
TWAS
US National Academy of Sciences

The board meets once a year in Trieste at the ICTP Winter College on Optics
At ICTP:

- ICTP Winter College on Optics
- ICO/ICTP Gallieno Denardo Prize
- Anchor Research Initiative in Optics: QCL+ optical tweezers (SPIE, INFN)
- Elettra-ICTP Laser Laboratory
- Advanced Workshops at ICTP and regionally
ICO/ICTP Gallieno Denardo Award

The recipient receives a certificate, US$1,000, and the invitation to participate in and deliver a lecture at an ICTP activity relevant to optics.

Past winners:

2000: Arbab Ali Khan (Pakistan)
2001: Arashmid Nahal (Iran) and Fernando Perez Quitian (Argentina).
2002: Alphan Sennaroglu (Turkey)
2003: Robert Szipöcs (Hungary)
2004: Imrana Ashraf Zahid (Pakistan) and Revati Nitin Kulkarni (India)
2005: Sarun Sumriddetchkajorn (Thailand)
2006: Hector Manuel Moya-Cessa (Mexico)
2007: Svetlana V. Boriskina (Ukraine)
2008: Mourad Zghal (Tunisia)
2009: Saifollah Rasouli (Iran)
2010: Cleber Mendonça (Brazil)
2011: Ivan Moreno (Mexico) and Ryan Balilli (Philippines)
2012: Selcuk Akturk (Turkey)
2013: Mohammad Dhafer Al-Amri (Saudi Arabia)
The lab provides short-medium term support for many of ICTP’s STEP students, Associates, etc. and specializes in applications of short pulse lasers. STEP students have benefitted from a Mentorship program of the OSA.

An ICTP Associate, Joanna Modupeh_Hodasi, from Ghana at work in the Laser Laboratory

Anchor Research Initiative with SPIE, INFN, Elettra: Quantum cascade laser systems and optical tweezers (with Dan Cojoc, IOM)
Recent ICTP optics activities regionally

2011 Regional Workshop on Optofluidics and Optical Manipulation*, Cape Coast, Ghana: D. Cojoc, P. Buah Bussah, F. Alottey, J. Niemela (ICTP)

*Leads to new research initiative in optical tweezers

Public events incorporating hands-on activities at ICTP Laserfest in Trieste (support from SIOF, SPIE)
UNESCO* Active Learning in Optics and Photonics (ALOP) program

*International Basic Sciences Programme at UNESCO

With stops at:
Philippines
Ghana
Tunisia
Morocco
Mexico
Brazil
Chile
Algeria
Tanzania
Colombia
Cameroon
Zambia
India
Nepal
Rwanda
Armenia…

Major continuing financial support from SPIE, (+additional support from EPS, US NAS)

2011 SPIE Educator of the Year Award!
Why optics and photonics?

Optics as an “enabling” science which can have an important long-term impact on the technological capacity building in countries with emerging economies.

Easy to demonstrate inquiry-based teaching methodologies in physics using optics where required equipment can be relatively inexpensive.

It is visual, has colors and generally tends to excite the imagination of students in all parts of the world

ALOP modules for a 5-day course

Module 1: Introduction to Geometrical Optics
Module 2: Lenses and Optics of the Eye
Module 3: Interference and Diffraction
Module 4: Atmospheric Optics
Module 5: Optical Data Transmission
Module 6: Wavelength Division Multiplexing
The facilitator and advisory team:

Zohra Ben-Lakhdar*, University El Manaur, Tunisia
Souad Lahmar, University El Manaur, Tunisia
Ivan Culaba, Ateneo de Manila University, Philippines
Vasudevan Lakshminarayanan, University of Waterloo, Canada
Joel Maquiling, Ateneo de Manila University, Philippines
Alex Mazzolini**, Swinburne University of Technology, Australia
David Sokoloff***, University of Oregon, USA.
Minella Alarcon, UNESCO, France (retired)
Joseph Niemela, ICTP Italy (Interim Director)

*UNESCO L’Oreal Prize winner for Africa
** ASPEN representative
***AAPT (Past President)

Responsible at UNESCO Paris: Jean Paul Ngome
ALOP in Action
Follow-up

Follow-up is crucial for success and sustainability as is the use and development of low-cost, locally produced equipment.

ALOP has as its goal the identification and nurturing of new facilitators in developing countries.

ALOP training manual has been translated into French, Spanish, Arabic.

Collaboration

ALOP began as, and remains a good example of ICTP-UNESCO Paris collaboration
**Purpose:** Foster excellent science and technology in the Middle East

+ Build bridges between diverse societies (the challenging part)

**SESAME** = Synchrotron-light for Experimental Science and Applications in the Middle East (2.5 GeV light source).

A major facility, under construction near Amman.

**Members:** Bahrain, Cyprus, Egypt, Israel, Iran, Jordan, Pakistan, Palestinian Authority, Turkey

**Observers:** France, Greece, Germany, Italy, Japan, Kuwait, Russian Federation, Sweden, Switzerland, UK and USA.

Pending: Iraq
In pictures (2011)

Above: the microtron (electron injection device from Bessy I, now replaced) together with UNESCO ADG Kalonji
THANKS
for your attention