National Research Foundation | iThemba LABS Laboratory for Accelerator Based Sciences

Update on Activities in South Africa (and on the African Continent)

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iThemba LABS & Univ. Cape Town, RSA

IUPAP WG.9 meeting, June 1, 2013, Rome

South African Science at external Large Scale International Facilities

Inbound

Outbound

Astronomy : SKA ….

Nuclear : iThemba, …

Other : ……

HEP/Nuclear : CERN, JINR

Interdisciplinary : Synchrotrons

Nuclear Physics Research

iThemba LABS

Facilities

Afrodite Gamma Array

K600 Magnetic Spectrometer

Fast neutron facility

Low level Gamma counting facility

Target lab

Scientific themes

- Basic nuclear physics (reactions mechanisms/nuclear structure)
  - Chirality, Tetrahedral shapes, Giant Resonances , Hoyle states , neutron rich nuclei)
- Applied nuclear physics (environmental radioactivity, neutron physics)
  - Neutron Dosimetry and Calibration, Neutrino Detection)
- High energy physics (ALICE at CERN)

Program Advisory Committee approves projects

User Group meetings 2x per year

Update on RIB Developments

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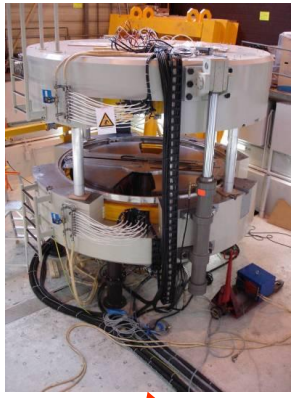
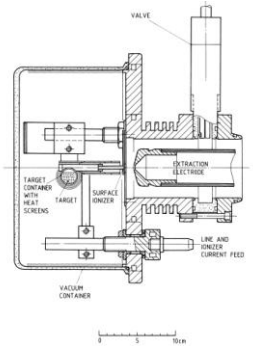




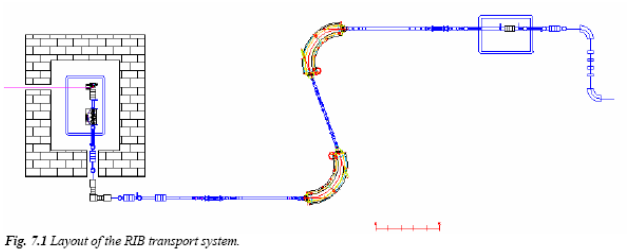
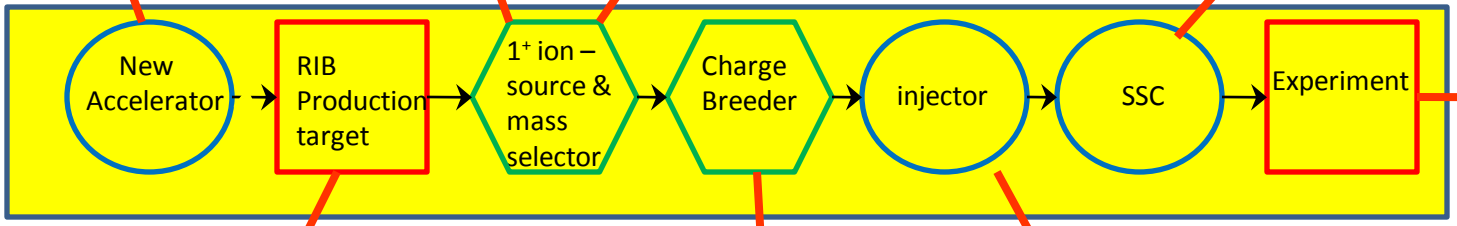
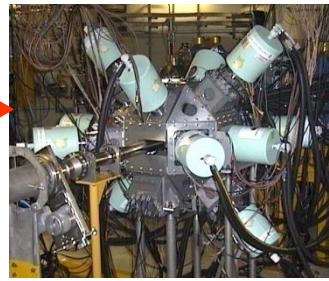
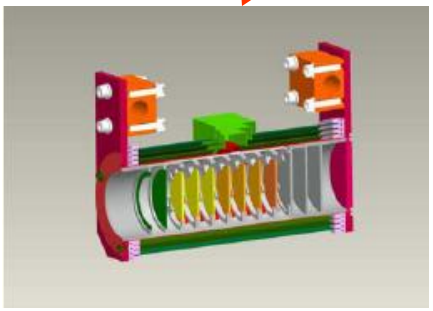
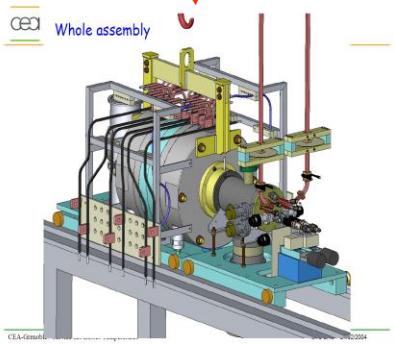


Fig. 7.1 Layout of the RIB transport system.

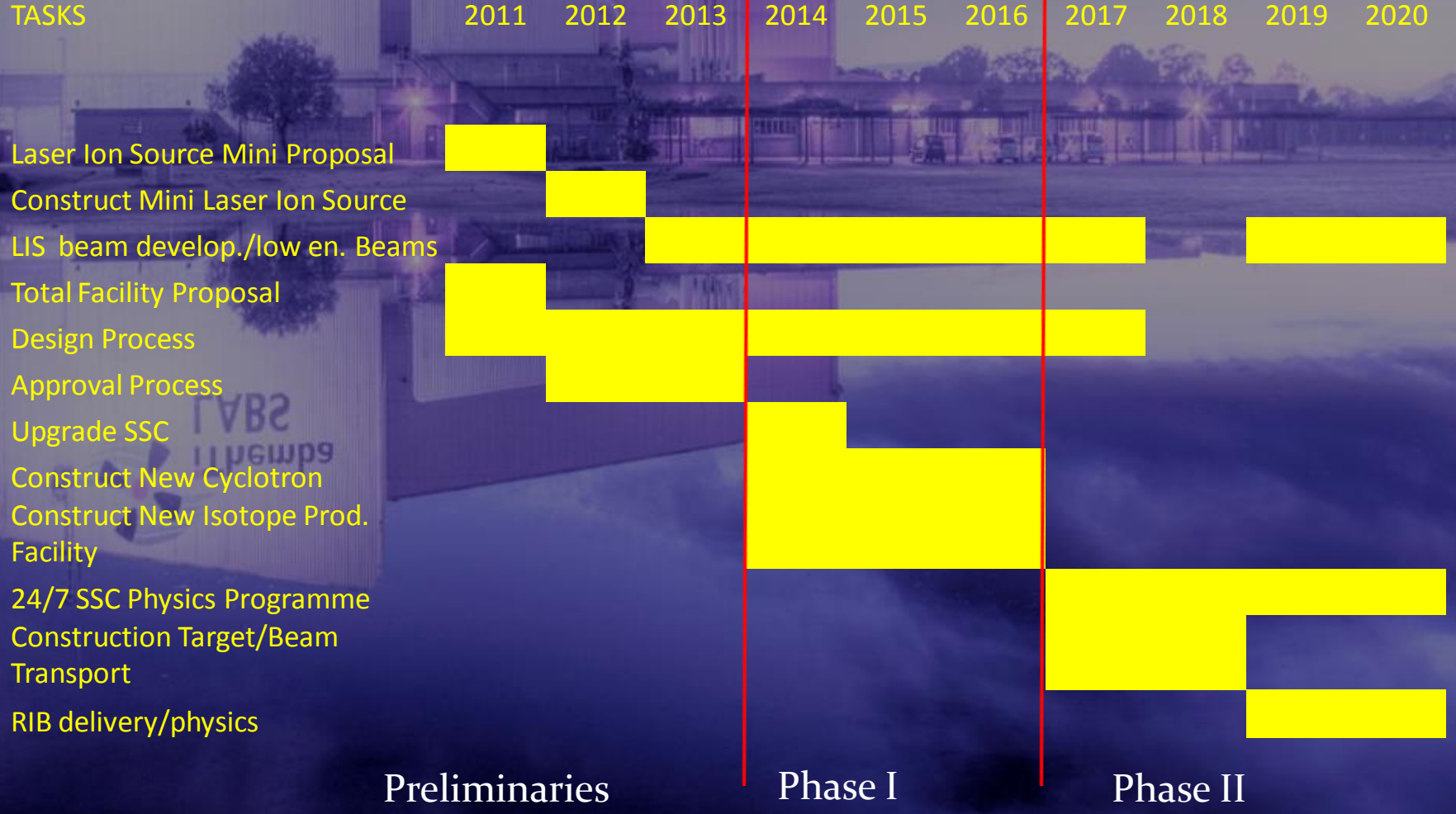




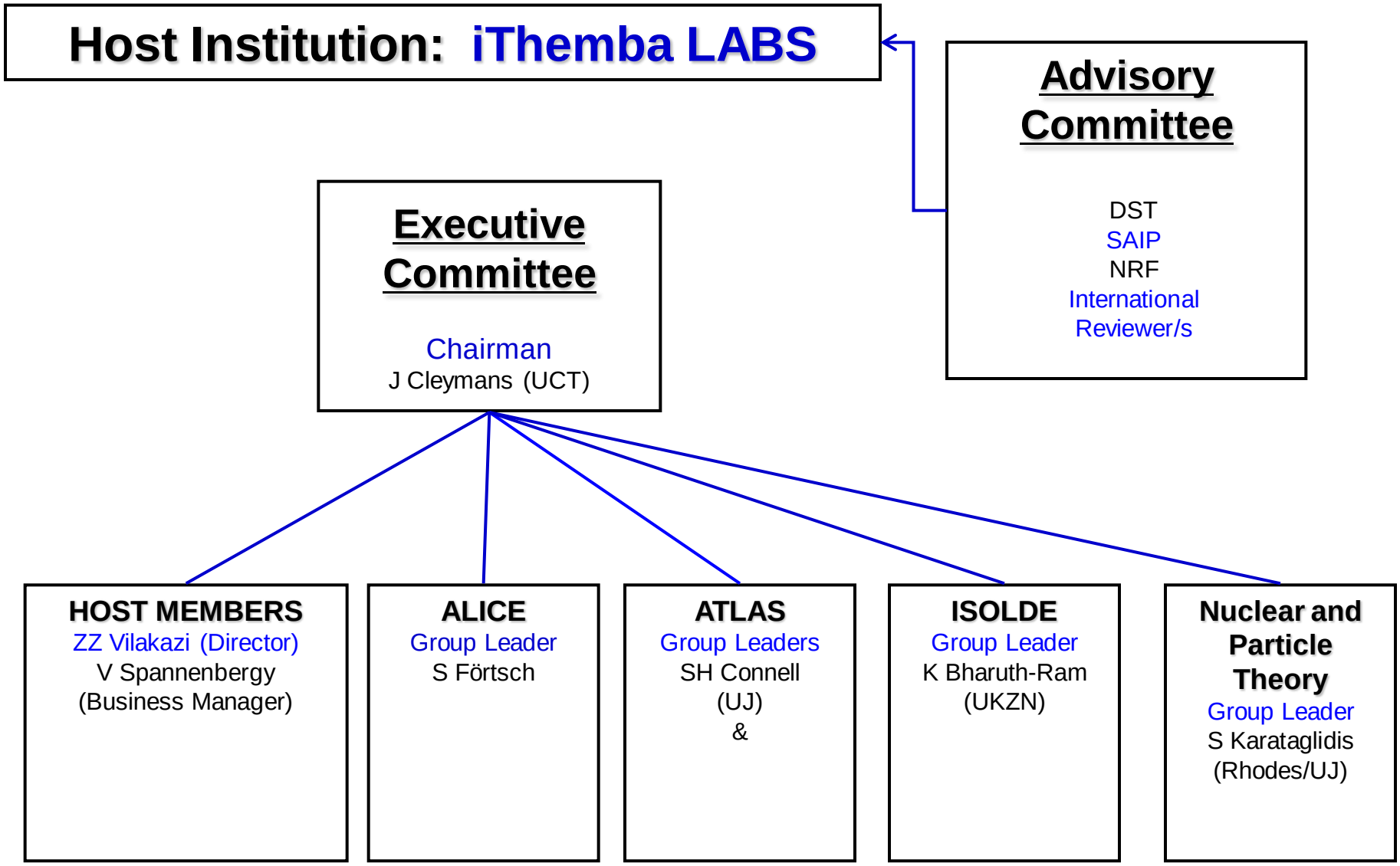




iThemba Timeline – Phased Approach



Nuclear & Particle Physics → SA-CERN Program



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Funding Situation: Access to international Programmes

- CERN Participation:
  - Massive brain gain to RSA
  - S & T Ministry commitment €2.7 M over three years to support SA participation in various projects: April 2013 ☺
- SA-JINR Associate Membership:
  - Renewal of SA Commitment $ 1 M p.a.
- Synchrotrons:
  - Agreement with ESRF for SA membership ~ €0.32 M p.a.

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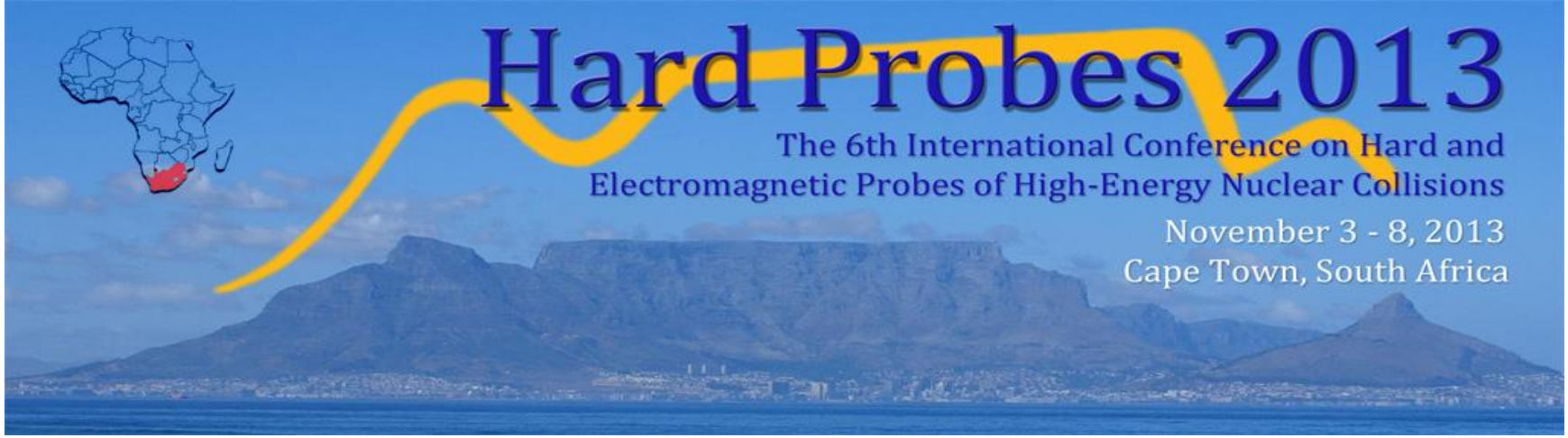
Capacity Building:

Conferences/Workshops & Schools

Hosted under the auspices of SA-JINR collaboration

The Symposium will be devoted to the investigation of nuclei in extreme states and, in particular, at the limits of nuclear stability (from very light neutron- and proton-rich). Topics to be discussed are:

- Exotic Nuclei and their Properties
- Rare Processes and Decays
- Evolution of Shell Structure
- Collective Modes of the Nucleus
- Nuclear Astrophysics
- Applications of Exotic Beams in Materials



The topics for this Hard Probes conference are:

- Jet Quenching and Observables
- High Transverse Momentum Light and Heavy Flavour Hadrons
- Initial State and Proton-Nucleus Collision Phenomena
- Heavy Flavour Production and Quarkonia
- Hard and Thermal Electroweak Probes

The African School of Fundamental Physics and its Applications

On behalf of Kétévi A. Assamagan
BNL (ex Togo; W Africa)

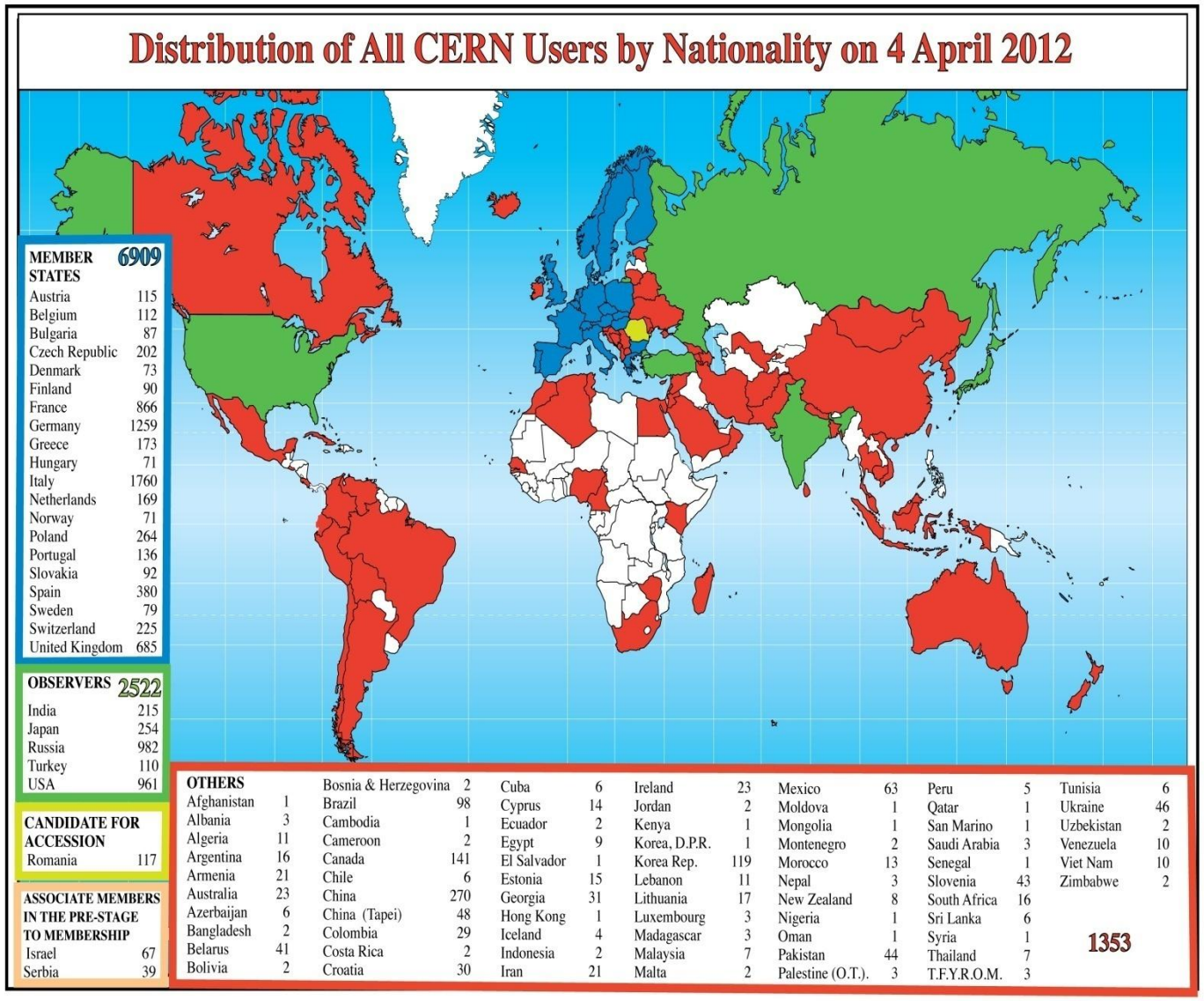
http://africanschoolofphysics.web.cern.ch/AfricanSchoolofPhysics/

Objectives

- **Increase capacity in fundamental physics and related applications**
  - Organizing a biennial school rotating in different African Countries
  - Networking among African Students
  - Sharing of information on high education opportunities around the world
- **First edition of the school, ASP2010**
  - August 1-21, 2010 (3 weeks) in Stellenbosch, South Africa. Attended by 65 students from 17 countries
- **Second edition of the school, ASP2012**
  - At the Kwame Nkrumah University of Science and Technology (KNUST), Kumasi Ghana. July 15 – August 8, 2012 (3.5 weeks). Attended by 50 students from 15 countries
- **School participation is free of charge to the selected students**
  - For ASP2012 for example, we received 132 applications from all over Africa, of which we selected 50

The issue and the context

- Low participation of African scholars in major research labs around the world. Some examples:
  - CERN users
  - Users of LHC experiments
- Not limited to CERN. Broader issue



About 0.5% of CERN users are African Nationals

African Participation in ALICE

Only South Africa: 2 institutes with 5 members. Collaboration over 1000 members

LHCb: 60 institutes, over 800 members. No African participation. There may be a few Africans through participating institutes.

African Participation in ATLAS

In ATLAS, Morocco and South Africa. Several institutes, about 35 members total. Size of the collaboration: over 3,000

In CMS, only Egypt with 1 institute, 10 members. Size of the collaboration: over 3,000

The program

- Theoretical foundation of Nuclear and particle physics
- Experimental particle physics
- Applications
  - Nuclear medicine
  - Accelerator physics
  - Light sources
- Simulations, data analysis
- Information technology, grid computing

http://indico.cern.ch/conferenceDisplay.py?ovw=True&confId=145296

Organization

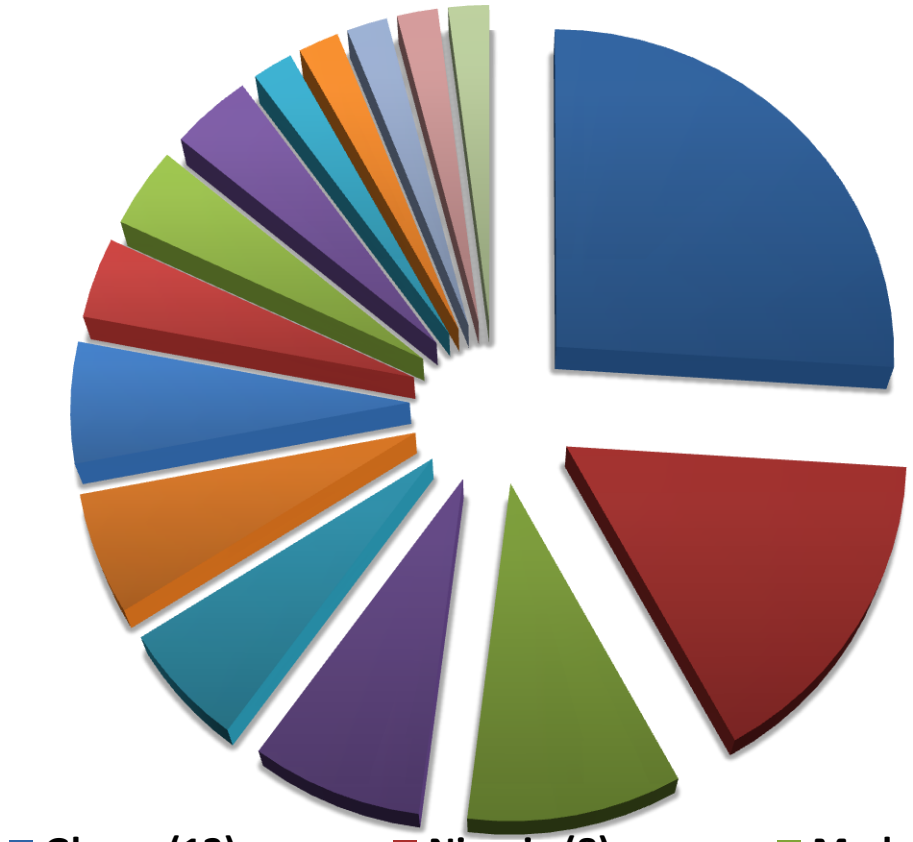
- International Organizing Committee (IOC)
  - Bobby Acharya
  - Kétévi Assamagan
  - Christine Darve
  - John Ellis
  - Steve Muanza
- Local Organizing Committee (LOC)
- International Advisory Committee (IAC)

How to contact us: ASP2012-IOC@CERN.CH

Financial Support

- Voluntary contributions from individuals and institutes. So far from
  - Europe
  - US
  - South Africa
  - Institutional representatives in the IAC
- Need to improve our fundraising and outreach efforts. Reach out to Asia

Student Distribution



ASP2012

Ghana (13)
Nigeria (8)
Madagascar (5)
Sudan (4)
Cameroon (3)
Senegal (3)
South Africa (3)
Algeria(2)
Congo (2)
Kenya(2)
Benin(1)
Egypt(1)
Iran(1)
Tanzania(1)
Zambia(1)

ASP2012 Support from

First Week

ASP Follow ups

- Maintaining contacts with the students ASP-Students-Network@cern.ch
  - This list contains students from ASP2010 and ASP2012
  - Exchange of information on higher education around the world
- Direct contacts with individual students
- Laza Rakotondravohitra, a student of ASP2010, awarded Fermilab International Fellowship to pursue Ph.D. there http://www.symmetrymagazine.org/article/september-2012/african-school-of-physics-student-awarded-fermilab-international-fellowship?email_issue=23
- A few students from ASP2012 will be proposed for same Fellowship

ASP Follow ups

Since ASP2012, a strategic plan has being drawn between INFN and KNUST for the development of a "Ghana Multi-disciplinary Compact Laser Synchrotron at KNUST". It is a research infra-structure that will cost less than 15 M€, that can be installed inside the KNUST campus in a dedicated building (25×40 m^2) and can feed several fields of scientific and technological research and serve a wealth of multi-disciplinary applications, based on a Compact Laser Synchrotron. It may constitute a national infrastructure to provide Ghana with an advanced resource to develop science and technology at the national and international level.

Conclusions

- **The first 2 editions of the African School have been very successful and well received. Due to:**
  - Support from institutes and individuals in Africa, Europe and the US
  - Dedication of students and lecturers
  - Motivation of organizing committee
- **Need to improve in outreach and fund raising**
- **We will start working soon on ASP2014 to take place in 2014 in Senegal.**

Footage of ASP2012: http://cdsweb.cern.ch/record/1472184