

African Initiatives with CNRS-IN2P3

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Outline

- 1 Structure of French Public Research
- 2 IN2P3 Previous and Current Actions
- 3 IN2P3 Future Actions
- 4 Students Opportunities at French Universities
- 5 Conclusions and Prospects

Public Research in France

National Research Institutions

- CNRS: "National Center for Scientific Research" (since 1939)
 - Depends on "Ministry for Higher Education and Research"
 - More than 11,000 permanent researchers
 - More than 13,000 permanent engineers
 - Physics Institutes:
 - IN2P3: "National Institute for Nuclear and Particle Physics" (mostly experiments)
 - INP: "National Institute of Physics" (mostly theory)
 - INSU: "National Institute of Universe Sciences" (astrophysics)
 - DERC: "Direction for European Research and International Cooperation" (have an office in Pretoria, SA)
- CEA: "Commission for Atomic and Renewable Energies" (since 1945)
 - Depends on "Ministry of Defense"
 - More than 15,000 permanent personnels
 - Physics Institutes:
 - IRFU: "Institute for Research on Fundamental Laws of the Universe" (theory and experiments)

Universities

- Number: 67 universities (responsible for teaching and delivering diplomas, plus local research)
- CNRS-IN2P3: out of 20 labs, 18 are associated to universities and most often located on their campuses

IN2P3 Previous and Current Actions in Africa

HESS Experiment

- H.E.S.S.: High Energy Stereoscopic System
- Based in Namibia (visit there on sunday TBC)
- Lead contributions by Germany and France
- Phase I (2002-2012):
 - France built the initial cameras
- Phase II (2012-2019):
 - CNRS-IN2P3: LUPM Montpellier, LLR Palaiseau, CENBG Gradignan, LAPP Annecy, CPPM Marseille
 - CNRS-INSU: IPAG Grenoble, LUTH ("Observatoire de Paris") Meudon
 - CEA-IRFU: CEA Saclay, Gif-sur-Yvette
 - Personnel: 35 permanent physicists & post-docs, 15 PhD, 15 engineers
 - Contributions: electronics upgrade 2013, additional large telescope (28 m)
 - **Current collaboration spokesperson: Matthieu De Nauroi (LLR, Palaiseau)**
 - Next collaboration meeting at CPPM Marseille (22-26 Oct. 2018)

IN2P3 Previous and Current Actions in Africa

HESS Experiment



Figure: HESS Phase II Telescopes, Namibia

IN2P3 Previous and Current Actions in Africa

SKA Project

- S.K.A.: "Square Kilometer Array" (World's largest radio astronomy facility)
- Based mainly in South Africa and Australia (plus Namibia, Botswana, Mozambique, Ghana, Ethiopia, Madagascar,...)
- France (CNRS-INSU) and South Africa are members of the international consortium
- French contribution: founding member and phase I (2019-2024) optimization
 - Personnel: 150 persons involved
 - Leading role: "Extragalactic spectral lines" and "Impact of SKA-Low antenna frequency coverage"
- **Research and study opportunities:** <http://www.ska.ac.za/students/>

IN2P3 Previous and Current Actions in Africa

SKA Project



Figure: SKA artist view and map

IN2P3 Previous and Current Actions in Africa

SKA Project



Members

Host Countries: Australia, South Africa, United Kingdom



African partner countries

IN2P3 Previous and Current Actions in Africa

Theory Cooperations

- Many small scale projects mainly under CNRS-INP (Algeria, Morocco, Tunisia, South Africa,...)
- Too many scattered cases for me to describe here

CFMA Projects

- C.F.M.A.: "Cooperation France-Mediterranean-Africa" (several projects)
- Proposed and run (2008-2013) by CNRS-IN2P3 (Fairouz Malek, LPSC Grenoble)
- Partner countries Algeria, Morocco (ATLAS), Tunisia (CMS), Egypt (CMS)
 - I gained the first institutional support for ASP from CNRS-IN2P3 in 2007
 - Between 2008-2010, the ASP preparation under CNRS-IN2P3 was managed under CFMA
 - During this period we obtained additional supports (CERN, ICTP, FNAL, JLAB, BNL,...)
 - CNRS-IN2P3 played a crucial role in the launching of ASP2010 (main contributor)
 - For ASP2012-ASP2016, budget restrictions reduced to a few missions the IN2P3 contributions
 - This was even more severe at CEA-IRFU!
 - Since ASP2018, IN2P3 contributions is slowly starting anew (not CEA's)

IN2P3 Previous and Current Actions in Africa

CFMA Projects



Figure: "Symposium in HEP for Mediterranean and Africa"
Ecole Polytechnique, Palaiseau (25-26 may 2010)

Transition between HESS and CTA Experiments

- Most of the labs involved in HESS are also involved in CTA
- Foreseable start-up of CTA is not before 2023
- Hence, France and others are considering to prolong HESS from 2019 till 2022
- Discussions are on-going...
- Upper management transfer:
 - From Germany and France to South Africa and Namibia
 - Telescopes would be donated to South Africa and Namibia
 - They would have to ensure the running costs
- *"Phase III" (2019-2022):*
 - Still excellent physics program
 - Even complementary to CTA after 2023
 - Example: gamma ray bursts measurable 8 hrs before the southern CTA site in Chile

IN2P3 Future Actions in Africa

Concerted Effort amongst CNRS Institutes

- After recent discussions, CNRS-IN2P3 director (Dr. Reynald Pain) and CNRS-IN2P3 deputy director (Dr. Ursula Bassler, **member of ASP IAC**) agree to consult with their peer at CNRS-INP, CNRS-INSU and possibly DERC I to bring a more constant and concerted support to ASP

International Projects with CNRS-DERCI

- Informal links I make between CNRS-DERCI and ASP contacts
 - **Ghana**: ACE3 "Call from World Bank" to create "Africa Higher Education Centers of Excellence Project" (several tens of US \$M)
Current discussion: buy a ThomX (<https://thomx.lal.in2p3.fr/>) device to start training people in Africa in view of a large Light Source facility
 - **Senegal**: Discussion about the construction of a France-Senegal new campus in Dakar area

Students Opportunities in France

Physics Studies in France

- Each IN2P3 (<http://www.in2p3.fr>) lab has a website with MSc and PhD offers every year
- Example: LAL Orsay, see <https://npac.lal.in2p3.fr/home/>
- For example: CPPM Marseille
 - FR: [Link](#)
 - EN: [Link](#)
 - Note: MSc physics lectures at Aix-Marseille University are in english!
 - My usual advice: even if you got your MSc from an African University, redo 1 year MSc in France so as to get a competitive ranking that enables to request a PhD bursary
 - Starting at PhD level is very complicated!
- ASP Mentorship Program:
 - We help advising a few students, we may write letters of recommendation
 - My case: Katawarou Beltako, ASP2014 alumnus, did his MSc in Marseille and will defend his PhD thesis in october (I'm expecting to get his write-up document soon)
- "ASP-Students-Networkcern.ch":
 - We forward MSc, PhD, Post-Doc offers we hear off to ASP alumni

Conclusions and Prospects

- Special public research structure in France
- Past and current CNRS-IN2P3 actions in cooperation with Africa
- Future CNRS-IN2P3 actions in cooperation with Africa
 - Concerted effort by the different CNRS Institutes (IN2P3, INP, INSU, plus DERCI?)
- Increased financial support for IN2P3 lecturers
- Call to CEA-IRFU to re-embark on the ASP adventure...