November 21, 2011

2nd Biennial African School on Fundamental Physics and its Applications

Proposal for a
School of Physics in Africa

We have established a biennial school of physics in Africa, on fundamental subatomic physics and its applications. The aim of the school is to build capacity to harvest, interpret, and exploit the results of current and future physics experiments with particle accelerators, and to increase proficiency in related applications, such as medicine, and technologies, such as IT. The school is based on a close interplay between theoretical, experimental, and applied physics. The first school took place in Stellenbosch, South Africa on 1-21 August 2010. We propose the second edition of the biennial school in Ghana in 2012.

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Executive Summary

Subatomic physics stands on the verge of new discoveries that may challenge our understanding of the natural world. On one hand, we know that the current theories of the fundamental particles and their roles in the evolution of the Universe are incomplete. On the other, the Large Hadron Collider (LHC), which was constructed to reach energies an order of magnitude beyond those of any previous accelerator, has started operating with a promise of new discoveries.

An enormous progress has led up to this point; pioneering experimental efforts have enabled a highly precise theoretical consolidation of what is known as the Standard Model of particle physics, summarising our current understanding of matter and forces, and novel accelerator and detector designs have spurred cutting-edge developments in a number of related fields such as computing, medical physics, cryogenics, and materials science.

To increase the capacity in Africa to undertake this journey, and to profit from the applications and technologies developed alongside of it, we proposed to establish a new school of physics in Africa, on fundamental physics and its applications, to be held every two years. The contents are aimed primarily at doctoral students and on students finishing their last year of university studies, but young researchers are also encouraged to apply.

The first edition of the school took place in August 2010 in South Africa: it utilised the existing strong scientific foundation in South Africa as a base from which students and scientists from neighbouring sub-Saharan countries and beyond were reached [1, 3]. The continuity of a biennial school will contribute to the needed mid-term development of Fundamental Physics knowledge in Africa. We propose the second edition of the school in July-August 2012 in Ghana.

Introduction

A school of fundamental physics and its applications, ASP2010, took place in Stellenbosch, South Africa, on August 1–21, 2010 [1]. The school was based on a close interplay between theoretical, experimental, and applied physics. It covered a wide range of topics: particle physics, particle detectors, astro-particle physics and cosmology, computing, accelerator technologies and some of the applications, such as medical physics, light sources and magnetic confinement fusion. The participating students were selected from all over Africa and beyond. A selection of lecture topics in theory, experimental and applied physics was proposed for the school. Scientists from Africa, Europe and the USA were invited to prepare and deliver lectures according to the proposed topics taking into account the diverse levels of the students. The duration of the school allowed for networking — interactions among students and between students and lecturers. The school was funded by institutes in Africa, Europe and the USA, and in no small part by the ICTP.

By all accounts, ASP2010 was a very successful school as can be seen from the final report and the numerous press releases [2]. The success of the school is due to the financial support from fifteen institutes in the USA, in Europe and in South Africa, to the dedication of the organising committee, to the devotion of the lecturers, and to the interests of the students themselves. Many students in Africa face challenges in terms of the logistical support, the quality of education and the opportunity for higher education abroad. It is often the case in Africa that even the best students do not have the needed support to succeed or to acquire the necessary skills to be competitive at an international level. It was particularly important for the ASP2010 organising committee to help resolve some of the challenges that students from Africa face. It is not to suggest that this particular school has solved all the issues, not at all. However, it is hoped that this school was useful in terms of networking, which in turn will help prepare the students to find practical answers to many issues that they may need to resolve.

Looking at the long term objectives (to help improve high training and education in Africa) that motivated the organisation of ASP2010, the success of ASP2010 is encouraging and provides motivation to work harder towards the original objectives by organising the school again in the future, and in doing so, truly contribute in a significant way to development in Africa. To build up on the success of ASP2010, the organising committee proposes a similar school in 2012, ASP2012, but in a different African country. The committee has explored this option, and of the various host countries proposed, Ghana has been selected to host ASP2012.

Topics

Three main topics will form the backbone of the school: 1) Theoretical Physics, 2) Experimental Subatomic Physics, and 3) Accelerators and Technologies. In addition to lecture courses, each topic will include hands-on exercises on computing-related aspects, including Grid and high-performance computing.

Further, each main topic will contain a number of additional exercises for student projects. These will be completed in groups, with a single lecturer (mentor) assigned to each group. These groups will also provide opportunities for discussing questions arising from the lecture material. The groups will be assigned on arrival, and time will be reserved for this activity each working day during the school. These daily discussion sessions will provide a framework for mentoring students from different backgrounds. Each group will deliver a short presentation at the end of the programme.

Finally, six special lectures will be organised during the school, to highlight the edge of current research and topics of special interest to the host region. These will be more pedagogical in nature, and could be opened to a wider audience, e.g., from the host institution and its surroundings. There will be one such talk for each of the three main topics. A further two slots are reserved for presentations focusing on physics in Africa. The last slot is to be used as an eye opener to a topic not directly overlapping with those of the school; examples could be fusion energy, medical physics, climate physics, or a topic particularly relevant to the local host area.

Venue, Scope, and Funding

Initially, a few countries were considered to host ASP2012. After discussions with several experts familiar with the physics community in Africa, Ghana has been selected as the venue for the second edition of this school. The proposed duration of the school is three weeks during the period of July–August 2012. Our target is to have 70 students attending, and to provide each of these with full bursaries. Funding for the school is currently being sought from the institutes that provided support for the first edition of the school in 2010, namely: ICTP, AECID Spanish Ministry of Foreign Affairs, Centre National de la Recherche Scientifique (CNRS)-IN2P3 (France), Institut des Grilles-CNRS and Commissariat à l'énergie atomique (CEA, France), Ecole Polytechnique Fédérale de Lausanne (EPFL, Switzerland) and Paul Scherrer Institute (PSI, Switzerland), National Institute of Theoretical Physics (NITheP, South Africa), National Research Foundation (NRF, South Africa), Fermilab (FNAL, USA), Department of Energy (DOE, USA), Brookhaven National Laboratory (BNL, USA), Jefferson Lab (USA), National Science Foundation (NSF, USA), CERN, and the International Union of Pure and Applied Physics (IUPAP).

Organisation

Tables 1, 2 and 3 show the members of the international organising committee, the local organising committee and the international advisory committee, respectively.

Table 1: The international organising committee of APS2012 in Ghana.

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Administrative and Financial expertise is provided by Mrs. A. M. Ferrer (IN2P3-ICBMS, Lyon).

Table 2: The local organising committee of APS2012 in Ghana.

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Table 3: The international advisory committee of APS2012 in Ghana.

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1 Title of Proposal

Biennial African School on Fundamental Physics and its Applications.

2 Type of Proposal

A school of physics, lasting 3 weeks, located in Ghana. The contents will be aimed primarily at doctoral students and on students finishing their last year of university studies, but young researchers will also be encouraged to apply.

3 Description of Topics

Three main topics will form the backbone of the school: 1) Theoretical Physics, 2) Experimental Subatomic Physics, and 3) Accelerators and Technologies. Each topic is further divided into an initial set of recaps of essential background knowledge, followed by four main lecture themes (five for experimental physics), and finally a dedicated theme on computing-related aspects of the topic, including Monte Carlo generators, Grid and high-performance computing. The latter will be structured partly into hands-on practical sessions.

Further, each main topic will contain a number of additional exercises for student projects. These will be completed in groups, with a single lecturer (mentor) assigned to each group. These groups will also provide opportunities for discussing questions arising from the lecture material. The groups will be assigned on arrival, and time will be reserved for this activity each working day during the school. These daily discussion sessions will provide a framework for mentoring students from different backgrounds. Each group will deliver a short presentation at the end of the programme.

Finally, six special lectures will be organised during the school, to highlight the edge of current research and topics of special interest to the host region. These will be more pedagogical in nature, and could be opened to a wider audience, e.g., from the host institution and its surroundings. There will be one such talk for each of the three main scientific themes. A further two slots are reserved for presentations focusing on physics in Africa, and may involve bringing in additional lecturers to the school specifically for this purpose. The last slot is to be used as an eye opener to a topic not directly overlapping with those of the school; examples could be fusion energy, medical physics, climate physics, or a topic particularly relevant to the local host area.

The lectures will be divided into full and half days, spread evenly across the programme. On full days, there will be 6 hours of lectures. On half days, there will be 3 lectures (two in the morning and one in the evening) and either hands-on exercises or work on student projects in the afternoon. To round off the afternoon session on half days, a Q&A session or special lecture will be scheduled in the late afternoon / evening. Not counting the arrival and departure weekends and allowing one free/excursion day per week, we arrive at 16 days of school programme. 5 afternoons will be required for the practical exercises, and 4 afternoons will be dedicated to work on the student projects, for a total of 9 half days and 7 full days. Leaving 1 hour aside for welcome and practical information, this gives a total of 68 lecture hours to be divided among the topics.

3.1 Theoretical Physics

The theoretical physics (TH) theme will be concentrated in the first half of the school. The focus is on theoretical nuclear and particle physics, with the emphasis on particle physics, and the main purpose is to describe the Standard Model of particle physics, including its foundations in quantum field theory. Additional main topics will be physics beyond the Standard Model, the interplay with astro-particle physics and cosmology, particle physics phenomenology, and computer physics.

Assigning 20 lecture hours and one practical session in total to the TH theme (including its special' lecture), the outline of the programme would thus be organised as follows:

- THR: Recaps (4h): examples of possible recap topics are elementary nuclear and particle physics, classical field theory, relativistic kinematics, quantum mechanics in a subatomic physics context, group theory, and mathematical methods.
- TH1: Foundations of Nuclear and Particle Physics (3h): should prepare the students for the subsequent lectures on the Standard Model and Beyond. Examples of subjects in this category are the road from nuclear models to particle physics, the role of conserved currents and charges, perturbation theory, field theory, and gauge theories.
- TH2: The Standard Model (3h): the central subject of the theoretical particle physics theme. It should acquaint the students with the current state of elementary particle physics, including the known elementary particles, the fundamental forces, and electroweak symmetry breaking. It should also introduce particle physics phenomenology.
- TH3: Beyond the Standard Model (3h).
- TH4: Astro-particle physics and cosmology (3h): the cosmological standard Model, including inflation, dark matter and dark energy, large-scale structure, and the overlap of subatomic physics and cosmology in the early universe.
- TH5: Computer physics (3h + 1 practical session): numerical methods, Monte Carlo event generators. Practical session on Monte Carlo event generators.
- TH6 Theoretical heavy-ion physics. Theoretical background and phenomenological models.
- THX: Special lecture on Theoretical Particle Physics (1h).

Each of the lecturers on the topics TH1–TH5 will be asked to provide additional exercises for student projects related to the material covered.

3.2 Experimental Subatomic Physics

The Experimental Subatomic Physics (EP) theme deals with what we know about subatomic physics from experiments and how we know it. It will be divided evenly over the duration of the school. A significant part of it will focus on reviews of the existing body of experimental knowledge, including particle physics, heavy-ion physics, and nuclear physics. Further, a course on data analysis will give participants an introduction to how raw data are transformed into final measurements, including calibrations, backgrounds and uncertainty estimations. The participants will also be given a thorough review of the extremely versatile range of modern particle detectors, such as those employed by the LHC experiments, and several practical sessions will be devoted to HEP Computing, focusing on Grid computing.

Assigning 32 lecture hours and 3 practical sessions in total to the EP theme (including its special lecture), the outline of the programme would thus be organised as follows:

- EPR: Recaps (4h): particle-matter interactions, main detecting techniques, basics of statistics
- EP1: (4h) Particle Detectors. the hardware of particle detectors from triggers to silicon pixels to calorimeters and muon chambers. Instrumentation, and detector alignment. Instrumental backgrounds.
- EP2: HEP Physics Objects and Data Analysis (4h): tracking, reconstruction, jets and jet algorithms, particle identification. Physics backgrounds and calibration.
- EP3: Experimental particle physics (4h). Introduction, overview of the current state of the field.
- EP4: Experimental Nuclear Physics (2h). Introduction, overview of the current state of the field.
- EP5: Experimental heavy-ion physics (4h). Introduction to experimental heavy-ion physics, overview of the current state of the field.
- EP6: HEP Computing (6h + 3 practical sessions): from data acquisition to Grid computing. Practical session on Grid computing in general. Practical session on doing the Monte Carlo simulation from TH5 on the Grid. Introduction to ROOT. Practical session on data analysis using ROOT on simulated data obtained from the TH5/Grid practical sessions.
- EP7: Experimental astro-particle physics (3h).

- EPX: Special lecture on Experimental Subatomic Physics (1h).

Each of the lecturers on the topics EP1–EP7 will be asked to provide additional exercises for student projects related to the material covered.

3.3 Accelerators and Technologies

The Accelerators and Technologies (AT) theme will be concentrated in the second half of the school and will cover accelerators, the physics of particle beams, instrumentation, and related technologies, including highlights on the Large Hadron Collider, on cryogenics and materials science, on medical physics applications, and on information technology.

Assigning 22 lecture hours and one practical session in total to the AT theme (including its special lecture), the outline of the programme would thus be organised as follows:

- ATR: Recaps (4h): examples of possible recap topics are electromagnetics, thermodynamics, optics, and solid state physics. Elementary computing tools such as Linux usage and shell scripting.

- AT1: Accelerators (5h): accelerator physics and technology, cryogenic systems, superconductivity, magnets, radio frequency acceleration techniques.

- AT2: The Physics of Particle Beams (3h): Electromagnetism, beam dynamics experiments, diagnostics, computational methods in beam physics.

- AT3: Instrumentation (2h): Magnet and RF instrumentation, alignment.

- AT4: Medical Applications, Laser and Geophysics, Nuclear Physics, Materials Science , Solid-State Physics (4h): in the framework of accelerator R&D and construction, numerous specific devices and applications have been born. We will put special emphasis on medical applications here but the specific topics will be determined by the lecturer(s) and may include, besides medical applications of accelerators and beams, radiography, energetics, applications of synchrotron radiation in materials science, and R&D for future accelerators.

- AT5: Computing Tools (3h + 1 practical session): high performance and parallel computing, including performance profiling and memory management, e-infrastructure, code management and revision control, documentation, coding for on-line systems, and the "sysadm" side of computing. Practical session on topic of lecturer's choice.

- ATX: Special lecture on Accelerators and Technology (1h).

Each of the lecturers on the topics AT1–AT5 will be asked to provide additional exercises for student projects related to the material covered.

4 Organisation

4.1 Number of Lecturers

Assigning one lecturer to each theme (18 themes in total) plus one for each recap session, a total of 21 lecturers will be required to cover the main topics, with each lecturer responsible for 2–5 hours of content (not including practical sessions). Further, we expect that three of the six special lectures can be provided by lecturers already at the school, such that this part can be covered by 3 additional lecturers. The school thus calls on a total of 24 lecturers to fill the slots. Note that this number may still be reduced, according to overall funding levels.

4.2 Tentative Main Speakers

We here give a list of names of possible speakers on each of the three main topics, with tentative assignments to the themes within each topic they could lecture on. We have received positive statements of interest from most of them already at this point. We have attempted to spread this list so that there are at least a few tentative names assigned to each of the themes. Apart from this list, the members of the organising committee will of course also make themselves available to the pool of lecturers, should the need arise.

Possible names for main speakers on theoretical physics are: Nima Arkani-Hamed (IAS Princeton; TH3,THX), Bruce Basset (U. of Cape Town; TH4), Jean Cleymans (U. of Cape Town; THR, TH1), Dan Hooper (Fermilab; TH4, THX), Robert de Mello Koch (U. Witwatersrand; TH1), Markus Luty (UC Davis; TH3, THX), Fabio Maltoni (UC Louvain; TH2, TH5), Elena Ferreiro (USC, Santiago de Compostela, TH6), Maxim Perelstein (Cornell U; TH1, TH3), Carlos Salgado (Santiago U.; TH1, EP2), James Wells (CERN and U Michigan; THR, TH2), Urs Wiedemann (CERN; TH1, EP2).

Possible names for main speakers on experimental subatomic physics are: Valérie Barret (U. Clermont-Ferrand; EP2), Simon Connell (U. of Johannesburg, EP6), Daniel Denegri (IRFU Saclay; EPR, EP1, EP4), David D'Enterria (CERN; EP2, EP3), Laurent Duflot (LAL Orsay; EP1, EP4), Daniel Fournier (LAL Orsay; EPR, EP5, EPX), Daniel Froidevaux (CERN; EPR, EP5), Tord Ekelof (University of Uppsala, Sweden, EPR, EP5), Karl Jakobs (University of Freiburg, Germany, EP1, EP2) Fabiola Gianotti (CERN; EP1, EPX), Ioanis Giomataris (CERN, EP5), Artur Szostak (INFN Cagliari; EP6), Thomas Ullrich (BNL; EP2, EP3), Zeblon Vilakazi (iThemba LABS; EP3), Terry Wyatt (U. Manchester; EPR, EP4).

Possible names for main speakers on accelerators and technology are: Bruce Becker (U. Cape Town; AT5), Anne Dabrowski (CERN, AT3), Christine Darve (FNAL; ATR, AT1, AT3), Manjit Dosanjh (CERN; ATR, AT4), Giorgio Margaritondo, (EPFL, AT5), Bernhard Holzer (CERN; AT2, AT3), Philippe Lebrun (CERN; ATX, AT1), Lenny Rivkin (PSI, AT5), Marco Silari (CERN, AT4),

4.3 Expected Number of Participants

We expect 70 participants, with at least half coming from the African continent. We aim to provide all participants with full travel bursaries, and in case of limited funds will give priority to students residing in Africa or who are of African nationalities.

As described above, we expect a total of 24 lecturers to be required. Adding international and local organisers, the total is expected to be 102 heads participating. Lecturers that are not members of the organising committee will not be expected to stay the full duration.

4.4 Duration and Preferred Dates

Our proposal is to hold a school of three weeks duration, every two years. The preferred date of the second school is July/August 2012, considering other schools and conferences in the region and selecting the date to coincide to the extent possible with quiet periods in the academic calendar.

In addition to the major holidays, Ghanaian universities have a long summer break in the months of July and August. Thus the proposed date of July/August was chosen to incorporate this week into the date of the school and thus minimise the impact on teaching schedule (for local lecturers). We do not expect this to be a problem for attracting students as the school is aimed toward postgraduates, who typically do not have coursework constraints. Furthermore, the July/August period coincides nicely with the European/North American summer, maximising the possible participation of students and lecturers from overseas.

The school will last three weeks. During the first week, the emphasis will be mostly on recaps of essential background material and on theoretical physics, the middle week will focus more on experimental physics, and the last week will focus mostly on accelerators and technology. Throughout the three weeks, computer-based practical sessions (e.g., on the Grid) and group discussions will take place.

4.5 Preferred Venue

The school is focused primarily on sub-Saharan Africa. Within that region, Ghana has been identified as the venue most likely to maximise the number of local potential participants (co-operation between CERN and Ghana has been initiated recently) as well as minimising overall logistics and security concerns. Inside Ghana, several alternative venues are possible, e.g., the University of Ghana in Accra or the Kwame Nkrumah University of Science & Technology (KNUST) in Kumasi.

A venue that keeps students and teachers together for as much of the day as possible is preferred. A venue that facilitates transport to and from the school is likewise preferred. The final choice should also be a function both of expressions of interest from local host institutions as well of overall funding levels.

4.6 Infolab Requirements

The practical sessions of the school call for a room equipped with at least 35 Internet-enabled computers (such that 70 students can work 2-by-2) with reasonable processing speeds. The machines do not need to be powerful enough to run massive computing themselves, this will be done by Grid computation, but they should be sufficiently fast and have sufficient disk space to compile and run small stand-alone test programs. At least FORTRAN and C/C++ compilers, ROOT, and presumably also some Grid software will be required to be installed prior to the school. Linux platforms are preferred. The Internet connection must be of broadband quality and reliable.

5 Relevance to Scientific Development in Africa

International cooperation is a large common denominator of the culture of scientific activities. However, in many scientific disciplines and especially in our field of Fundamental Physics, the cooperation among African countries and between them and Northern countries is not sufficiently developed. This is especially the case for sub-Saharan Africa. We therefore want to extend the usual international scientific ties in our field to this geographical zone.

With this project it is therefore our aim to initiate and support academic and research cooperations in Fundamental High Energy Physics with countries in sub-Saharan Africa.

It is *not* our aim to set this up as a strictly one-way effort to bring our knowledge and experience to African colleagues and students, but rather to establish a genuine Integrating Global Network.

For this reason, the programme we propose includes as an essential aspect mentored group sessions working on projects with discussions, so that each student may draw the maximum individual benefit from the schools.

The second edition of the school will utilise the existing scientific foundation in Ghana as a base from which students and scientists from neighbouring sub-Saharan countries and beyond can be reached. The continuity of a biennial school will contribute to the needed mid-term development of Fundamental Physics knowledge in Africa. In particular, by organising the school again in Ghana in 2012, we will build upon the success of the first school held in 2010 in South Africa.

More precisely, what we envisage is:

- running a biennial Schools of Fundamental Physics with lecturers from Europe, Africa, and the USA and mainly African students from different countries,

- to foster and promote academic exchange programs for research visits between the 3 continents

- to promote the access to training-ships in research laboratories and university attendance for African students in African countries different than their home countries, in Europe, and in the USA

- to facilitate the integration of research teams based in Africa within large international research centres like CERN, FERMILAB, and other host centres of large-scale accelerator-based science projects,

- to promote the access of African physicists and students to leading-edge technologies utilised in High Energy Physics for the design and operation of particle accelerators and detectors and for the Information Technology needed for the control of facilities as well as for Data Analysis. This involvement in technology has its own scientific interest, but may also be especially favourable to developing countries.

6 Financial Support

The main funding item on the school budget is the student bursaries, covering the travel and stay of all the attending students. We strongly believe being able to provide such bursaries is vital to the success of the project.

6.1 Financial Support Requested

Our budget is based on 70 students supported for the full three weeks of the school, 24 lecturers supported for 6 days each, and 5 organisers supported for the full duration of the school (possibly rotating between a larger pool of individual organisers). Note that the total of 25 required lecturers is arrived at by assigning at least one organiser to act as lecturer as well.
Table 4 contains the detail of the foreseen incomes and expenditures.
To arrive at our funding goal, we request €50000 from the ICTP.

6.2 Other Sources of Financial Support

The school is in the process of seeking a total of €102,500 in additional funding from the following institutes: AECID Spanish Ministry of Foreign Affairs, Centre National de la Recherche Scientifique (CNRS)-IN2P3 (France), Institut des Grilles-CNRS and Commissariat à l'énergie atomique (CEA, France), Ecole Polytechnique Fédérale de Lausanne (EPFL, Switzerland) and Paul Scherrer Institute (PSI, Switzerland), National Institut of Theoretical Physics (NITheP, South Africa), National Research Foundation (NRF, South Africa), Fermilab (FNAL, USA), Department of Energy (DOE, USA), Brookhaven National Laboratory (BNL, USA), Jefferson Lab (USA), National Science Foundation (NSF, USA), CERN and the International Union of Pure and Applied Physics (IUPAP).

Each of these institutes supported the first edition of the school in 2010. They were particularly pleased with the success of the school in 2010 [2]. They have been approached again and expressed interest in supporting the second edition of the school in 2012 in Ghana. In addition, BUDGET

Income	
Sponsorship: ICTP	50,000
Other Sponsorships	102,500
Support for students from local Ghanaian Institutes	20,000
Total Income	**€172,500**
Preparation Costs	
Meetings of the Committees (travel, subsistence)	7,500
Communication (Poster, Web development)	500
Subtotal	8,000
Cost of Bursaries	
Student bursaries (70 students × 20 days × €50)	70,000
Lecturer bursaries (24 lecturers × 6 days × €62)	8,928
Organiser bursaries (5 organisers × 20 days × €62)	6,200
Subtotal	85,128
Travel Costs	
Travel - Non-Ghanaian Students (55 × €700 on average)	38,500
Travel - Lecturers & Organisers (26 × €700 on average)	18,200
Local Transportation	2,500
Subtotal	59,200
School Organisation, Events, and Overheads	
Opening Function (80 × €10)	800
School banquet (80 × €28.75)	2,300
Paper materials & stationery, postage, resource CDs	600
Bags and name badges (100 × €5)	500
Social events (3 × €500 - transport, visits, refreshments)	3,000
Insurance for non-Ghanaian Students	2,500
Other expenditures and overheads	1,000
Subtotal	10,400
Contingencies	10,000
Total Expenditure	**€172,428**

Table 4: Incomes and expenditures for the school. All amounts are in € unless otherwise specified. The bursaries include accommodation and catering.

we will seek a total of €20000 from individual national agencies within Ghana to help with the students accommodation costs. However, shaving this latter part off the budget would reduce the number of full student accommodation bursaries from 70 to 50, with the remaining 20 being half-bursaries. We thus do not critically depend on the availability of funds from national agencies.

References

[1] Steve Muanza, et al, ”African School of Fundamental Physics and its Applications”, **http://AfricanSchoolofPhysics.web.cern.ch**, August 2010

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[3] Christine Darve, et al, ”First African School of Fundamental Physics and its Applications”, American Physical Society, Forum on International Physics, **http://www.aps.org/units/fip/newsletters/201103/darve.cfm**, APS April Meeting, 2011

A Brief CVs for the Organisers

CV for Bobby Acharya

Name: Bobby Samir Acharya
Personal: born in Kampala Uganda, January 20th 1972 (British nationality).
Present address: International Centre for Theoretical Physics, Strada Costiera 11, Trieste 34014 ITALY
Phone: (+39) 040 2240380 **Email:** bacharya@ictp.it

Academic CV:
2004-present: Staff Research Scientist, ICTP Trieste.
2000-2004: Research Associate, New High Energy Theory Centre, Rutgers University
1997-2000: PPARC Research Fellow, Queen Mary, U. of London
1997: PhD in theoretical physics. Queen Mary, U. of London. Thesis advisor: C. Hull.
1994: Master degree in Quantum Fields and Fundamental Forces. Imperial College, U. of London
1993: B.Sc in Theoretical Physics. Royal Holloway, U. of London

Other professional and organisational activities:
Organiser, ”Summer School on Particle Physics in the LHC Era”, ICTP 2009
Organiser, ”First Joint INFN-SISSA-ICTP Conference on Physics from the LHC” ICTP 2009
Organiser, ”Signaling the Arrival of the LHC Era,” ICTP, 2008
Organiser, ”Cosmology and Strings,” ICTP 2007
Organiser, ”School on Physics at the LHC: Expecting LHC”, ICTP 2006
Organiser, ”Workshop on String Vacua and the Landscape” ICTP 2006

PhD Students: Roberto Valandro (PhD 2007, postdoc in Heidelberg) and Francesco Benini (PhD 2008, postdoc in Princeton).

Publications:
57 research publications since 1995 with over 2500 citations.

CV for Ketevi Assamagan

Name: Ketevi Adikle Assamagan
Personal: born in Port-Gentil, Gabon, on March 12th, 1963. (Togo, USA citizenship)
Present address: Department of Physics, Brookhaven National Laboratory, Upton, New York 11973, USA
Phone: (+1) 631 344 4041 or (+41) 76 487 2682. **Email:** ketevi@bnl.gov

Academic CV:
Jan 2008 onwards: Permanent Staff, Brookhaven National Laboratory, Upton, NY USA
Oct 2008-Sep 2010: Higgs working group convener for the ATLAS experiment.
Jan 2008: Permanent staff physicist at Brookhaven National Laboratory (BNL).
Jun 2007: High luminosity pileup software tools coordinator for the ATLAS experiment.
Jan 2004-Mar 2007: Physics Analysis Tools coordinator for the ATLAS experiment.
Sep 2003-Sep 2005: Muon Spectrometer Event Data Model (EDM) coordinator for the ATLAS experiment.
1998-2001: Post-doctoral fellow at CERN on the ATLAS experiment.
1995-1998: Post-doctoral fellow at Jefferson Lab.
1995: PhD, University of Virginia, Charlottesville, VA 22901.

Other professional and organisational activities:
Member of the American Physical Society.
Member of the National Association of Black Physicists.
Convener of the ATLAS Higgs working group.
2004-2007: Coordinator of the ATLAS Physics Analysis Tools.
2007- present: Coordinator of ATLAS high luminosity pileup.
2003-2005: Coordinator of the ATLAS muon spectrometer EDM.
Currently supervising two Ph.D. theses.

Publications:
Upwards of 400 publications in scientific journals since 1994

Scholarships and awards:
2004: Outstanding student mentorship award, BNL.

CV for Christine Darve

Name: Christine Darve
Personal: born on May 27th, 1972 in France, French citizenship.
Present address: Fermi National Accelerator Laboratory, Accelerator Division, MS347, Batavia IL 60510-0500, USA
Phone: (+41) 630-359-7017 **Email:** christinne.darve@cern.ch

Academic CV:
Sep 2001-present: Permanent staff engineering physicist & cryogenic engineer, Fermilab, USA
July 2010-present: Users,DGS, CERN, CH
Nov 2010-present: Reviewer for the American Standard of Testing and Materials, Task group C16
2011: PhD. in Fluid Mechanics, Northwestern University, USA, Title "Numerical Studies of Super-fluid Helium Dynamics in the Two-Fluid Model"
Sep2007-Jul 2010: Project Associate for the LHC Commissioning, CERN, CH
Sep 1999-Sep 2001: Associate Engineer, Technical Division, Fermilab,USA
Feb 2001-Sep 2001: Associate Engineer, Northwestern University, USA
Sep 1996-Sep 1999: Fellow, LHC Division, CERN, CH
Feb 1996: Graduated in Thermo-Mechanics of Systems and Materials (M.Sc. and M.E.),Institut Polytechnique de Sevenans (UTBM), France
ep 1990-Jun 1992: "Classes Preparatoires" in Mathematics, Physics and Technology, Grenoble, France
Sep 1995-Sep 1996: Technical Student, Division EP, CERN, CH
Feb 1994-Jul 1996: Technical Student, DRN Dept, CEA, France

Other professional and organisational activities:
Main organizer of the first edition of the "African School on Fundamental Physics and its Applications" (ASP2010)
Coordinator for the SRF R&D test areas cryogenic operation at FNAL
Reviewer and chairman of several international engineering conferences
Member of the American Standard of Testing and Materials
Member of the American Physical Society
Member of the African Physical Society
1998-1999: Executive secretary of "Physics sans Frontiere", Organized a summer school in Sarajevo: "The Web-Internet: a windows on Sciences and Technology"
1995: Member of the Administration Council of the Institut Polytechnique de Sevenans (UTBM)

Publications:
Wrote more than 50 engineering publications with over 250 citations

CV for John Ellis

Name: Jonathan R. (John) Ellis
Personal: born in London, England, July 1st, 1946

Academic CV:
Sep 2010 onwards: Clerk Maxwell Professor of Theoretical Physics, Physics Department, King? College London Jun 1978 onwards: Indefinite Contract in TH Division, CERN, Geneva
Sep 1974 onwards: Staff Member in TH Division, CERN, Geneva
Sep 1973-Aug 1974: Research Fellow in TH Division, CERN, Geneva
Sep 1972-Aug 1973: R. C. Tolman Research Fellow in Theoretical Physics, Caltech, Pasadena
Sep 1971-Aug 1972: Research Associate at SLAC, Stanford
Sep 1970-Aug 1971: Visiting student in TH Division, CERN, Geneva. Supervisor Prof. John Bell
Oct 1968-Sep 1970: Research student in DAMTP, Cambridge. Supervisor Dr Bruno Renner.
1971: Ph.D. in Theoretical High Energy Physics, University of Cambridge. Thesis title: “Approximate Symmetries of Hadrons”
1968: Part III of Tripos in Theoretical Physics. University Prize for joint first student
1967: B.A. in Mathematics, University of Cambridge. First Class Honours in Parts IA, IB and II of Tripos

Other professional and organisational activities:
1999-present: Advisor to the CERN Director-General for relations with Non-Member States including Africa
1999-present: Chair of the Evaluation Panel for Norwegian High-Energy Physics (responsible for advising the Norwegian Funding Agency)
2005-present: Chair of the “Physics Opportunities for Future Proton Accelerators” Committee
2006-present: Member of the extended CLIC Steering Committee
2007-present: Member of the Science Board of STFC, the UK Science and Technology Facilities Council (responsible for advice on scientific programme of STFC)
2007-present: Chair of the LHC Safety Assessment Group
2006-2007: Member of the Science Committee of PPARC (responsible for advice on scientific programme of PPARC)
2004-2007: Member of the Council of PPARC, the UK funding agency for particle physics, astronomy and space science (responsible for general oversight of PPARC activities)
1998-2004: Chair of the Equal Opportunities Advisory Panel
1996-1999: Chair of Academic Training Committee
1995-1997: Member and Chair of Senior Staff Advisory Committee
1992-1997: Founding Member of the LHCC
1990-1993: Founding Chair of Scientific Information Policy Board
1988-1994: Division Leader, TH Division, CERN; Member of Management Board; Member

of Research Board; Member of Committee for Coordination of Research.
1985-1988: Member of the Committee of Nine (representatives of senior staff)
1983-1987: Founding member of the LEPC
1979-1982 and 1984-1987: Deputy Division Leader, TH Division, CERN

Scholarships and awards:
1982: Maxwell Medal of the UK Institute of Physics (Award for a young theoretical physicist)
1985: Elected Fellow of the Royal Society of London (Cited for role in the discovery of the gluon)
1991: Elected Fellow of the Institute of Physics
1994: Honorary Doctorate from the University of Southampton
1999: First Award in the Gravity Research Foundation essay competition (for "Search for quantum gravity", with N.E. Mavromatos and D.V. Nanopoulos)
2005: Dirac Medal and Prize of the UK Institute of Physics (Premier award for a theoretical physicist)
2005: First Award in the Gravity Research Foundation essay competition (for "The string coupling accelerates the expansion of the Universe", with N.E. Mavromatos and D.V. Nanopoulos)

Publications:
800 publications with over 40000 citations.

CV for Steve Muanza

Name: Guy Steve Muanza
Personal: born in Nancy, France on August 9th, 1966 (French citizenship)
Present Address: CNRS-IN2P3, Marseille, France
Phone: (+33) 49 182 7275. E-mail: muanza@in2p3.fr or muanza@fnal.gov

Academic CV:
2009-present: elected member of the Scientific Council at CPPM Marseille
2008-2010: Co-founder and contact person for ASP2010
Sep 2008-present: senior researcher at CPPM Marseille, D0 and ATLAS experiments
Sep 2006-Sep 2008: senior researcher at IPN Lyon, head of the D0 Lyon group
Nov 2005-Sep 2006: senior researcher at LAL Orsay, D0 experiment
Oct 2001-Nov 2005: senior researcher at IPN Lyon, D0 experiment
Oct 2000-Oct 2001: detachment at FERMILAB, D0 collaboration
Apr 2000: founder of the D0 group at IPN Lyon
Jan 1998-Dec 2001: full researcher, L3 experiment
Oct 1996-Jan 1998: full researcher, CMS experiment at IPN Lyon
Oct 1996: permanent position with CNRS-IN2P3 at IPN Lyon
Oct 1992- May1996: PhD thesis. Clermont-Ferrand University, ATLAS experiment

Research activities: Supersymmetry and Higgs boson searches at colliders,
Integration of Monte Carlo generators in the experimental software frameworks
Jet Energy Scale at hadron colliders

Other professional and organisational activities:

Member of the French Group on Supersymmetry Searches since 1997

- Co-convener of the Tools group since 2005
- Member of the Steering Committee since 2005

Member of the IPN Lyon Advisory Board (1997-2003) and Scientific Council (2005-2008)
Co-convener for New Physics, Les Houches “Physics at TeV Colliders” workshop, 2005
Main organiser of the Standard Model Backgrounds at LHC workshop at IPN Lyon, 2005
Co-convener of the Monte Carlo Simulation of the D0 experiment, 2003-2005
Supervisor of 3 PhD theses:

- T. Millet: Search for gluino pairs in 4b+missing ET with D0 detector at TEVATRON Run II, 2004-2007.
- J. Coss: Jet Energy Scale in D0 Experiment at TEVATRON Run II, 2000-2003.
- D. Teyssier: Search the Higgs boson with L3 detector at LEP II, 1999-2002.

Publications:

More than 300 publications in refereed journals since 1996