

2<sup>nd</sup> 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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# 1 Introduction

A school of fundamental physics and its applications, ASP2010, took place in Stellenbosch, South Africa, on August 1–21, 2010 [1, 3]. 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.

The 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.

## 1.1 Topics

Three main topics will form the backbone of the school: 1) Theoretical Physics, 2) Experimental Subatomic Physics, and 3) Accelerators, Technologies and Applications. 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.

39 These groups will also provide opportunities for discussing questions arising from the lecture  
40 material. The groups will be assigned on arrival, and time will be reserved for this activity each  
41 working day during the school. These daily discussion sessions will provide a framework for  
42 mentoring students from different backgrounds. Each group will deliver a short presentation at  
43 the end of the programme.

## 44 **1.2 Venue and Scope**

45 Initially, a few countries were considered to host ASP2012. After discussions with several  
46 experts familiar with the physics community in Africa, Ghana has been selected as the venue  
47 for the second edition of this school. The proposed duration of the school is three weeks during  
48 the period of July–August 2012. Our target is to have 70 students attending, and to provide  
49 each of these with full bursaries.

## 50 **2 Relevance to Scientific Development in Africa**

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

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

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

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

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

## 70 **3 Financial Support**

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

73 vital to the success of the project.

### 74 **3.1 Financial Support Requested**

75 Our budget is based on 70 students supported for the full three weeks of the school, 24 lecturers  
76 supported for 6 days each, and 5 organisers supported for the full duration of the school (pos-  
77 sibly rotating between a larger pool of individual organisers). Note that the total of 25 required  
78 lecturers is arrived at by assigning at least one organiser to act as lecturer as well.

79 Table 1 contains the detail of the foreseen incomes and expenditures.

### 80 **3.2 Potential Sources of Financial Support**

81 The school is in the process of seeking support from the following institutes: AECID Span-  
82 ish Ministry of Foreign Affairs, Centre National de la Recherche Scientifique (CNRS)-IN2P3  
83 (France), Institut des Grilles-CNRS and Commissariat à l'énergie atomique (CEA, France),  
84 Ecole Polytechnique Fédérale de Lausanne (EPFL, Switzerland) and Paul Scherrer Institute  
85 (PSI, Switzerland), National Institut of Theoretical Physics (NITheP, South Africa), National  
86 Research Foundation (NRF, South Africa), Fermilab (FNAL, USA), Department of Energy  
87 (DOE, USA), Brookhaven National Laboratory (BNL, USA), Jefferson Lab (USA), National  
88 Science Foundation (NSF, USA), CERN, the International Union of Pure and Applied Physics  
89 (IUPAP), and International Center for Theoretical Physics (ICTP, Trieste, Italy).

90 Each of these institutes supported the first edition of the school in 2010. They were partic-  
91 ularly pleased with the success of the school in 2010 [2]. In addition, we will seek a total of  
92 €20000 from individual national agencies within Ghana to help with the students accommo-  
93 dation costs.

## 94 **References**

95 [1] Steve Muanza, et al, "African School of Fundamental Physics and its Applications",  
96 <http://AfricanSchoolofPhysics.web.cern.ch>, August 2010

97 [2] Kétévi Adiklè Assamagan, et al, "African School of Fundamental Physics and its Ap-  
98 plications, August 1-21, 2010, Stellenbosch, South Africa, **ASP2010 Final Report**"  
99 <http://africanschoolofphysics.web.cern.ch/AfricanSchoolofPhysics/asp2010.pdf>, De-  
100 cember 2010

101 [3] Christine Darve, et al, "First African School of Fundamental Physics and  
102 its Applications", American Physical Society, Forum on International Physics,  
103 <http://www.aps.org/units/fip/newsletters/201103/darve.cfm>, APS April Meeting, 2011

## BUDGET

<b>Income</b>	
Total International Support Needed	152,500
Support for students from local Ghanaian Institutes	20,000
<b>Total Income</b>	<b>€172,500</b>
<b>Preparation Costs</b>	
Meetings of the Committees (travel, subsistence)	7,500
Communication (Poster, Web development)	500
Subtotal	8,000
<b>Cost of Bursaries</b>	
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
<b>Travel Costs</b>	
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
<b>School Organisation, Events, and Overheads</b>	
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
<b>Total Expenditure</b>	<b>€172,428</b>

Table 1: Incomes and expenditures for the school. All amounts are in € unless otherwise specified. The bursaries include accommodation and catering.