The African School of Fundamental Physics and Applications (ASP)

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International cooperation forms the common denominator of the today's culture of scientific activities. However, in many scientific disciplines and especially in fundamental and applied physics the cooperation among African countries and between them and the rest of the world is not well developed. This is especially the case for sub-Saharan Africa, which is one of the most rapidly developing regions in the world with great educational needs. In order to extend the existing international scientific ties to this geographical zone, we have established a biennial African School of Physics (ASP) [1] with a focus on fundamental physics and its applications.

The ASP series started in 2010 in South Africa, then Ghana (2012), Senegal (2014), Rwanda (2016), and Namibia (2018) [2-6]. The next edition of ASP was planned in Morocco in 2020—this is postponed to 2020 because of the COVID-19 pandemic. The ASP is based on the close interplay between theoretical, experimental, and applied physics, as well as computing. They cover a wide range of topics: particle physics, particle detectors, astrophysics and cosmology, Grid computing, accelerator technologies, medical physics, condensed matter physics, light sources, and their applications. About eighty students are selected from all over Africa, from an average of four hundred applications in each edition of ASP. Scientists from Africa, Europe, Asia, and the USA are invited to prepare and deliver lectures according to the proposed topics considering the diverse levels and backgrounds of the students. The duration of the school allows for extensive networking between students and between students and lecturers. A one-week training workshop for about seventy high school teachers and a one-week outreach for up fifteen hundred high school pupils are included in the program.

Research institutions, universities, government agencies, and foundations have sponsored ASP. The success of the school is sufficiently encouraging to provide motivation for a review of the ASP goals and for consideration of mechanisms that would make it sustainable. The central long-term objective of the School is to help improve higher education in Africa across national borders and in doing so, to contribute in a significant way to the development of science and technology on this continent. We believe that maintaining the leadership of the organization of the ASP series in partnership with other interested institutes and African governments and policy makers presents a unique opportunity for the US to pioneer the scientific and technological development of a region of more than 1 billion people with large unmet needs but vast human potential. What is needed at this time to ensure the future of ASP and the success of its mission are partners that can provide sustained support for the participations of African School students, teachers and pupils.

The biennial support for the participation of African Students, teachers and pupils in future ASP can be realized in various ways: Direct financial support to the budget of the school to cover participant travels; Travel support for ASP organizers / lectures from US institutes in the activities that enhance the reach and coverage of the ASP; or travel coverage for ASP alumni to spend 2-3 months at US research labs to work under the supervision of US scientists. At the end of each edition of ASP, the school organizers will identify the African students that would benefit from this support.

ASP is a school on fundamental physics and applications held biennially in different African countries. It has evolved to be much more than a school. It is a program of actions with directed ethos toward physics as an engine for development in Africa. The basic objective of ASP is to help improve the quality of higher education in Africa and to help increase the number of African

students acquiring higher education. This is achieved through an outreach effort, an increased awareness of the potential of high-quality training offered by large scale experiments in context of various scientific disciplines, and a system of networking on the international scale. There is a strong alignment between the mission and the vision of African governments and policy makers on education and capacity building and their programs with the goals of the ASP. The ASP is committed to include African governments in the planning, in order to take advantage of aspects such as consolidating agreements and their goals, building on synergy with other programs, improving the sustainability and impact of capacity development and improving the measurement and visibility of the impact. By working with African governments and policy makers on education, ASP seeks to promote a culture of science that creates an attractive environment for African student alumni, thus encouraging their retention within Africa. ASP promotes sustainable scientific development in Africa by building a network between African and international researchers for increased collaborative research and shared expertise.

ASP2010–18 were very successful schools as can be seen from the final reports and the numerous press releases. The success of the school is due to the financial support from institutes in the USA, Europe, Asia and Africa, and to the dedication of the organizing committee, to the lecturers, and 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 is particularly important for the organizing committee to help resolve some of the challenges these students face. It is not to suggest that this particular school has solved all the issues. However, it is hoped that this school serves at least two purposes: the organization of the school creates understanding of the many challenges and provides a template for solving them, and secondly it provides opportunity for networking, which in turn will help prepare the students to find practical answers to many issues that they face.

Looking at the long-term objectives (to help improve higher training and education in Africa) that motivated the organization of ASP2010–18, the success of the school is encouraging and allows us to review the ASP goals and consider mechanisms to make it sustainable. To build upon the success of ASP2010–18, the organizing committee of ASP proposes to establish a longer partnership between US institutes and African governments and policy makers on capacity development for the component of funding, and to develop the ASP project goals and the key performance indexes further. These developments are timely given the progress made by the ASP series and the synergy that can be established with the African policy makers on education and research.

[1] The African School of Fundamental Physics and Applications,
https://www.africanschoolofphysics.org/
[2] Activity Report of the First Edition of ASP, 2010,
http://africanschoolofphysics.web.cern.ch/2010/asp2010.pdf
[3] Activity Report of the Second Edition of ASP, 2012,
https://africanschoolofphysics.web.cern.ch/asp2012/asp2012_final.pdf
[4] Activity Report of the Third Edition of ASP, 2014,
https://www.africanschoolofphysics.org/wp-content/uploads/2014/11/asp2014.pdf
[5] Activity Report of the Fourth Edition of ASP, 2016,
https://www.africanschoolofphysics.org/wp-content/uploads/2019/08/ASP2016-FinalReport.pdf
[6] Activity Report of the Fifth Edition of ASP, 2018,
https://www.africanschoolofphysics.org/wp-content/uploads/2019/08/ASP2018.pdf