

**LIP International Advisory Committee**  
Meeting of 17th and 18th May 2013 in Lisbon

Present: C. W. Fabjan, P. G. Innocenti, L. Rolandi.

The LIP International Advisory Committee met in Lisbon on 17th and 18th May 2013 to review the 2012 results and discuss the 2013 programme of work.

Prior to the meeting, Committee Members received a detailed report on the work carried out in 2012, as well as a description of the activities planned for 2013.

Committee Members met with LIP Management: G. Barreira, P. Fonte, J. Mariano Gago, R. Marques and M. Pimenta.

Committee Members and LIP Management together met with each project leader to complement the information supplied in the written reports and to discuss matters arising. S. Andringa, one of the two secretaries of the LIP Scientific Committee, also reported.

In the past year particle physics was dominated by the Higgs discovery by the two experiments ATLAS and CMS. The rapid confirmation of this discovery and its prompt acceptance by the physics community was made possible by the independent observation in the two experiments.

In both experiments the LIP group made crucial contributions to the Higgs search and discovery. This concerns both the hardware contribution to the experiments as well as the contribution to the analysis of the experimental data.

Beside the ongoing effort in the experiment, both the LIP ATLAS and CMS groups are now engaged in significant contributions to the upgrade programs in order to cope with the planned increase in collision rate and high energies starting from 2015 onwards. This will put LHC in a new energy regime enlarging the possibilities to discover physics beyond the Standard Model. The Committee wishes to express its appreciation to the two groups for the success in the Higgs discovery but also for the other major contributions to the physics programs of ATLAS and CMS during the past year, as testified by a very large number of publications, many with direct LIP involvement. The Committee considers the upgrade plans well matched to the expertise acquired by the groups and to their strength.

The GRID services were set up for the LIP research activities and in particular for the Higgs discovery. It is important to note that 30% of the computing power was made available to other scientific activities outside particle physics. The Portuguese GRID infrastructure worked with very high reliability exceeding the 95% level. This

was achieved despite the fact that two key members were offered prestigious positions outside Portugal and that the overall system had to be downsized due to financial limitations. Staffing has become now critical with only one systems engineer left.

The CERN program is complemented by the participation in the COMPASS experiment where the LIP group has major responsibility in the Detector Control System and has been instrumental in defining the research direction in the next phase of the experiment.

The participation to the HADES experiment at GSI passed a major milestone with the commissioning of the RPC Time-of-Flight (TOF) wall that provides crucial particle identification with its time resolution below 100 ps. Data have been taken and the LIP group is also involved in their analysis.

The experimental research at the energy frontier is complemented by a range of phenomenological studies exploring the LHC discovery potential. This activity was also instrumental for the involvement of the University of Minho as a LIP Associate.

LIP has a large involvement in non-accelerator experiments. LIP assumes a major role in the Auger experiment. Recently it has proposed improvements to the detector aiming at a better measurement of the number of muons at ground and its fluctuation. The goal is to explain some anomalies observed in the shower shape for collisions exceeding 10 TeV of center-of-mass energy.

Few weeks ago the AMS experiment has shown tantalizing results on the measurement of the positron over electron fraction as function of energy. LIP is a long-term member of the AMS collaboration and continues to play an important role in the experiment also in the present phase of data taking and analysis. The Committee was pleased to see the high level of commitment of the LIP group in the AMS operation. However, it questions whether this high level can be sustained for the project lifetime of the AMS experiment. The Committee suggests considering measures redefining the procedures for the shifts in order to alleviate the load on the AMS groups.

The dark matter search experiment LUX has been installed underground and is now in the commissioning phase. The LIP group has the responsibility for detector control and part of cryogenic operations. The experiment is expected to produce competitive results by the end of 2014. The Committee takes note of the invitation to the LIP group to join the USA-UK Lux-Zeppelin (LZ) consortium aiming at the development of a 7 Ton liquid xenon detector.

The SNO+ experiment is being prepared for a run sensitive to the double-beta decay search. LIP contributes to the essential calibration system based on optical fiber technology whose installation is foreseen to be completed during 2013. Funding for the continuation in this experiment has to be secured.

These non-accelerator experiments represent a commitment over an extended period of time with participation to large international collaborations. As with the CERN experiments, the non-accelerator based experiments should be regulated by Memoranda of Understandings (MOUs) allowing funding agencies to be involved in the planning and in the monitoring through the corresponding Resource Review Boards (RRBs).

The Committee notes the successful collaboration with ESA in radiation damage studies of electronics components and modeling of the radiation environment of Mars and Jupiter. This will further strengthen the good collaboration between ESA and Portuguese industries.

LIP is involved traditionally in a number of detector R&D projects. Particularly noticeable is the success of the R&D on timing RPCs combined with high spatial resolution. Work also is in progress on studying silicon photomultipliers for several applications. Many of these detectors developments are being pursued also in view of medical imaging. While these developments have potentially far reaching possibilities in the medical field, the strategy to turn this R&D to practical applications in the hospitals is very difficult to implement. It requires a high level of a novel type of collaboration and commitments with the medical world and/or industry.

The program of LIP is very diversified in the field of high energy physics, astro-particle physics, detectors and their application. The level, in general, is excellent. However the participation to some of these activities depends on a very small number of researchers: This may be putting the continuity in danger. The situation is aggravated by the significant budget cuts experienced this year.

The Committee is pleased to see that the role of the ILO with CERN and other international organizations is producing positive results.

The level of commitment of LIP researchers to outreach is very visible. The Committee is very pleased to see continuous support for the Portuguese-language teachers program at CERN.

The overall appreciations of the Committee for LIP performance and programme of work are very positive and supportive: The very great majority of the programme is of an excellent level, ranking LIP very high on the international scale.

  
C. W. Fabjan      P. G. Innocenti.      L. Rolandi