20h May 2019

LIP International Advisory Committee

Meeting of 3rd and 4th May 2019 in Coimbra

Executive Summary

The LIP International Advisory Committee met in Coimbra on 3rd and 4th May 2019. Prior to the meeting, the Committee had received extensive and well-prepared documentation about the LIP activities. Oral presentations and discussions during the meeting provided further relevant information.

LIP's primary mission is the study of the fundamental laws of particle physics. The accelerator-based programme of this research is carried out at CERN, principally with the two flagship experiments ATLAS and CMS at the LHC. Cosmic rays and their astrophysics implications are studied with the world's largest array of earth-based detectors (Auger in Argentina) and on the International Space Station (AMS). Search for Dark Matter in our Universe is pursued with the LUX-ZEPLIN (LZ) experiment (in USA) and neutrino properties are investigated with SNO+ in Canada. These research programmes are conducted in large international scientific collaborations in which LIP has many leading positions, shares major responsibilities and makes first-class scientific contributions.

In parallel, LIP prepares for the future. In 2018, LIP teams continued to make significant progress with R&D and design towards the upgrade of ATLAS and CMS in preparation for the High-Luminosity LHC. The LIP teams also continue to make world-class contributions to the physics research based on LHC data. LIP has joined the DUNE collaboration on neutrino physics as a logic continuation of their SNO+ efforts and has already been entrusted with significant responsibilities. LIP is among the proponents of the new SHIP facility at CERN, proposing its RPC technology for precision time-of-flight measurements, in a programme searching for weakly interacting long-lived particles and studying neutrino physics. Noteworthy and very productive is the close involvement of LIP theorists in the interpretation of the results obtained by the experimental groups.

A second major pillar of LIPS's activities is the development of applications which have a direct and beneficial impact on society. This line profits from the competence of individuals and teams, notably particle detector R&D and construction techniques, electronics and computing. LIP's development of novel medical imaging instrumentation is one promising example. LIP also makes significant contributions to important programs in terrestrial and space radiation simulation and environmental monitoring.

LIP is maintaining its outstanding leadership in scientific computing, both internationally and within Portugal. Software developments, advanced algorithms and techniques and an excellent record of system management, performance and availability have made LIP a most welcome partner in several international projects as well as the leader in the deployment and operation of the Portuguese scientific computing infrastructure. The LIP computing teams are engaged in many important international collaborations and have again remarkably progressed in 2018.

LIP is aware of the importance of communicating science to the Public. Its staff is fully engaged in an innovative outreach programme, with an emphasis on attracting students to STEM and to particle physics, through seminars, masterclasses, internship and summer courses. The Committee considers this activity exceptional at a European level.

As noted previously, the remarkably diverse and multi-faceted research and R&D activities carry a certain risk of fragmentation. The LIP Leadership is fully aware of this risk and during 2018 has continued their efforts in sharpening the focus. As a consequence, several activities will be brought to a logical conclusion during 2019. R&D in the medical field will concentrate on the development of a brain scanner using LIP RPC technology and on another novel imaging technique. These efforts should get a boost in view of the

planned construction of a center for tumor therapy with proton beams.

Streamlining of efforts has also taken place in the study of detector properties and performance. All these actions aim at increasing efficiency in the use of the limited resources. The Committee applauds and encourages the LIP Management to pursue these lines of convergence.

The Committee was pleased to learn that the employment conditions at LIP continue to improve with the establishment of several professorships and the award of indefinite contracts. It is essential that these improvements continue, that ways are found to increase the ratio of permanent to fix term contracts to an international level and to provide a career perspective for young researchers.
The Committee encourages the LIP management to continue their constructive efforts in this direction.

The new management structure established in 2018 has proven to be effective. Notable achievements are the improved coordination among groups active in neighboring fields of research. The recently established Competence Centers is another fine example of improved use of human resources and competence.

LIP employs its limited financial and personnel resources with great care, which is one important factor for its remarkably successful and multi-faceted programme. The Committee is impressed by the scientific output of many research groups, despite sometimes extremely limited resources. Unsurprisingly, these restrictions are clearly limiting a number important of LIP activities.

The Committee feels appropriate to repeat its suggestion that the available funds could be used even more effectively if the Portuguese medium-term funding strategy would be more closely aligned with the long-term scientific research plans and engagements of the Laboratory.

The Committee congratulates the LIP directorate and the LIP staff for another exceptionally productive year with an impressive range of world-class activities. It thanks the Laboratory for the efficient organization of the review and for its hospitality.