

ECFA EUROPEAN COMMITTEE FOR FUTURE ACCELERATORS

Sent by post to the addresses listed at the end of this letter

ECFA/Secr./17/1735

21 June 2017

Subject: 2017 RECFA visit to Belgium

Dear,

It is my privilege to write to you on behalf of the European Committee for Future Accelerators (ECFA), which met in Brussels on 21 and 22 April 2017, in accordance with its mandate to visit CERN's Member States on a rotational basis and to report its findings to the national scientific authorities, as well as to the CERN Council during its European Strategy Sessions.

During the visit, the Committee heard presentations on the organisation and scientific activities of the high-energy physics community in Belgium. The meeting started with two very clear and instructive overviews of the available funding schemes, presented by the directors of the two main funding agencies in Belgium, Hans Willems (FWO-Vlaanderen) and Veronique Halloin (FNRS). Next was a series of detailed presentations covering activities in particle, nuclear and astroparticle physics in Belgium, including computing and outreach. Finally, a PhD student outlined the working conditions for PhD students in high-energy physics.

The Committee was very impressed by the well-coordinated and focused experimental programme in Belgium and noted that the regional funding structure does not seem to impede

strong national coordination, which has been markedly strengthened by the Interuniversity Attraction Poles programme (IAP). At CERN's LHC, five Belgian universities are members of the CMS experiment, where their combined contribution has made a highly visible Belgian imprint on this collaboration of over 2000 people. The Belgian contribution includes hardware deliveries to many of the CMS sub-systems as well as contributions to software and physics analysis, and in 2013 work carried out at the LHC led to a Belgian Nobel prize, for the Brout-Englert-Higgs mechanism. The significance of the Belgian contribution can be measured in the number of Belgian physicists occupying management positions in the collaboration and the number of PhD thesis awards, both of which statistics are well above the CMS average.

Cutting-edge theoretical work at all the universities complements the experimental programme. Theoretical activities are carried out in a highly collaborative spirit, both between the theoretical groups at the different universities, and between the theoretical and experimental communities. The activities cover broad areas of both formal theory and phenomenological model building. The theoretical community has organised joint initiatives that span several areas with a common unifying theme, such as models for Dark Matter.

The Committee was impressed by the activities on detector research and development work on technologies for particle and nuclear physics. The groups work with state-of-the-art technologies in the framework of flagship experiments, where they make very important contributions with a sizeable impact and have important responsibilities. Particularly impressive and ambitious is the programme for the High-Luminosity LHC upgrade of the CMS tracker. The Committee acknowledges the collaborative effort that led to this ambitious undertaking and believes that measures need to be taken to preserve such initiatives and, if anything, to extend them to other fields.

Belgium is planning to build one full outer tracker end-cap for the LHC Phase 2 upgrade. In addition to clean-room infrastructure, this will require many skilled research engineers and technicians. The fact that there is no dedicated funding for permanent research engineers and technicians is worrying. As a consequence, the know-how acquired by the different groups in the framework of their multiple contributions will be difficult to preserve. The lack of professional technical support has a negative impact on basic detector research outside the framework of the large experiments in which the community is involved, and therefore also on technology transfer.

During its previous visit to Belgium, the Committee noted that some of the strongly focused efforts could be advantageously diverted into the fields of flavour and neutrino physics. This has indeed happened, with a significant engagement in the CERN NA62 experiment and expanded activity in neutrino physics, including a major international neutrino experiment, SoLid, on Belgian soil. The Committee expects that this project, as well as the large accelerator-driven nuclear project, MYRRHA, will be of great benefit to Belgian science, technology and education.

Belgian efforts in astroparticle physics are focused on the IceCube experiment at the South Pole, which in 2013 for the first time observed neutrinos coming directly from violent cosmological events. Thanks to new staff positions, the astroparticle programme was expanded into a very promising “multi-messenger” astronomy project, aimed at combining observations from neutrino physics, cosmic rays and gravitational waves. These activities are supported by the FWO and FNRS foundations within the CosPa network, which aims to federate the various Belgian groups working on astroparticle physics and to increase the visibility of astroparticle physics regionally and nationally.

In the field of nuclear physics, Belgium has a large and well-organised community that is especially active at CERN’s ISOLDE facility, where it is among the five largest contributors. Nuclear physics activities in Belgium have been internationally recognised and Belgian physicists are prominent among the elected leadership of the European nuclear physics community. The community is presently struggling to find funding for investment into international facilities, in particular for the financing of the HIE-ISOLDE upgrade. This community, as is the case for the particle physics community, is losing slots for permanent engineering staff, thus endangering future contributions to infrastructure R&D and construction.

Belgian HEP computing is working very well. Two GRID clusters, at UCL and VUB/ULB, serve CMS and IceCube and host the computing activities of the SoLid collaboration. The clusters also support other groups and the GRID site is open to all researchers. While funding for infrastructure is adequate, the GRID membership fee, up to now paid by the abolished BelSpo, must be maintained.

The Belgian particle physics community has a very active outreach programme, including media interviews and articles, public lectures and articles in popular science magazines and on social media. These are complemented by interactive activities such as science weeks, visits to CERN, particle physics masterclasses and more. The Committee appreciates the training given to PhD students on communication with the public, and the funding opportunities for innovative outreach programmes.

It is encouraging that the number of MSc and PhD students has increased in recent years (since the last RECFA visit), as have the number of completed theses. The number of recognition awards these theses attracted, in particular in the CMS collaboration, is the best illustration of their quality. A general concern about future career opportunities in academia was expressed by the younger generation. However, there are many opportunities for graduates and post-graduates in industry, thus enabling knowledge transfer.

All in all, the Committee was very impressed by the scientific organisation and the high level of scientific activities in the Belgian community. It was very clear that the community has derived great advantage from the IAP programme, which ends in 2017. One of the important roles of this programme has been to foster deeper collaboration among the laboratories. While this highly successful programme is expected to be replaced by thematic collaborative projects, the Committee recommends considering the potential addition of a national umbrella organisation for the community's research. This organisation could efficiently address the problem of a dwindling technical staff at the universities by nurturing shared clusters of technical expertise. Such expertise will be especially vital in the near future when Belgium's HEP activities enter a hectic hardware construction phase for the CMS upgrade.

Yours sincerely,



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ECFA Chair

cc: Professor Jorgen D'Hondt, RECFA member, Director of IIHE-VUB

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