October 31, 2022

MEMO

From: Tiziano Camporesi,
Chair of the International Advisory Committee of the Centre of Experimental Nuclear and Particle Physics at Vilnius University

To: Whom it may concern

Following the meeting held **virtually in Vilnius** on October 24-25, 2022, please find attached the conclusions and recommendations of the International Advisory Committee.

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1. Overview of Lithuania's Engagement in CERN Activities

The International Advisory Committee (IAC) recall that Associated Members of CERN commit themselves to have a scientific, technical and industrial potential comparable to that required for CERN Member States as stipulated by CERN Council's decision in CERN/2918/Rev. In particular, *the following criteria must be fulfilled*:

a. existence within the applicant State of a **solid basis in elementary particle physics**, both theoretical and experimental, adequately funded both for the support of the research within the country and also for payment of travel and living expenses to enable the scientists of that country to participate in CERN activities.
b. existence of a sufficiently **developed industry** within the applicant State to enable it to tender for contracts with CERN with a reasonable chance of success.
c. the will of the national authorities of the applicant State to **support basic research** and their awareness of the implications of participation in a **common endeavour** in the field of **particle physics**.

The Task Force appointed by the CERN Council, while making a positive recommendation to the Council to accept the proposed association of Lithuania, identified as a major weakness the lack of a Particle Physics community and, as agreed by the Lithuanian authorities at the time, recommended setting up a structure which would promote the growth of the Particle Physics community by establishing a Centre for High Energy Physics hosted by Vilnius University. The Centre was created and started operating effectively in 2019.

Over the last 4 years we have witnessed the difficulties encountered by the Centre in overcoming the institutional, regulatory and ultimately resource obstacles to fulfilling its mission. On the positive side we note that, at the university level, the Centre has developed a teaching programme related to High Energy Physics and started Master and Doctoral programmes.

However, the activities of the Centre have been restricted by the limited number of human resources allocated, a situation which seems to be worsening today (the contract for an administrator helping the Chair has been discontinued and a post-doc contract has not been renewed). Moreover, no resources have been allocated to create infrastructure to enable significant contributions to CERN experiments, as was advocated in the CERN council task force recommendations.

We have also been following the developments in other areas such as material science that are indirectly linked to Particle Physics, and whose activities have never been connected to the Centre. These mainly concern R&D activities related to corresponding technical programmes at CERN (e.g., RD50, Crystal Clear, accelerator RF developments. These activities have been limited mostly by the amounts of funds allocated through the Lithuanian Academy of Sciences, which was managing the resources for these projects.

On the positive side, we witnessed a steady increase over the years in another important area linked to CERN, namely the growth of an industrial community providing goods, equipment and services to CERN, and we have also been encouraged by the growing public interest in Particle Physics stimulated by the Centre's outreach activities.

The Committee heard several encouraging reports during our meeting and thanks all the people who attended the meeting and made contributions, as summarised below:

- The Ministry of Education, Science and Sports highlighted an ambitious Action Plan to increase significantly the resources dedicated to Lithuanian activities related to CERN. The plan engages all Lithuanian government agencies (Education, Economy, Foreign Affairs) and has four main axes of investment (besides the statutory commitment towards CERN): education, R&D, infrastructure and business development.
- A first sign of clear will to expand commitments is the substantial increase in the budget allocation for 2022 for CERN-related projects, mainly of a technical nature, managed by the Lithuanian Academy of Sciences. It was announced that in the future all resources will be managed through the Research Council of Lithuania.
- The Committee witnessed in the presentation by the Lithuanian Academy of Sciences, Kaunas University, the Lithuanian University of Health Sciences and the Lithuanian Energy Institute the growing interest of activities linked to the CERN technical sector.
- The Committee also notes the increased societal impact of CERN-related initiatives such as the DeepTech Entrepreneurship programme and the creation of incubators and start-ups.
- The Committee notes favourably the intention of federating efforts among Baltic states to create a High Performance Computing (HPC)/Tier2 computing centre catering to the computing needs of CERN experiments.
- The Committee also notes favourably the revision of the High Energy Physics courses at Vilnius University which provides a solid basis for undergraduate students to progress to graduate work in Particle Physics.
- The Committee took note of the Lithuanian contributions to the initiatives of the Baltic states to promote High Energy Physics through Schools and Conferences.
- The Committee encourages the continuation of discussions among Baltic states towards the formation of a Hadron Therapy Centre.
- During the discussion of the plans for a structure dedicated to particle detector development and construction ('Pixel Laboratory'), which had been supported during previous meetings of the IAC, it became evident that the resources originally foreseen for developing this infrastructure had been diverted to other activities.

2. Recommendations and Conclusions

The Ministry's Action Plan is not yet approved, but the Committee supports it as a fundamental measure to achieve real progress towards implementing the recommendations of the CERN Council.

The Committee supports the formation of the consortium as a possible means to overcome the limitations of existing structures, consistent with the agreement with the CERN Council.

The Centre of Experimental Nuclear and Particle Physics, which was created to promote the growth of the Particle Physics community, should not only be a member, but play a key role in the decision-making of the Consortium. This does not seem to be the case now, as the Chair of the Centre was not involved in the creation of the Consortium. The IAC recommends that the consortium mandate and operational rules be formally written and submitted to the CERN-Lithuania Joint Liaison Committee.

The Committee supports the principle of having the Research Council of Lithuania as the entity responsible for overseeing the allocation of resources. The committee suggests that adequate High Energy Physics expertise be consulted in deciding priorities for resource allocations.

The Committee supports the idea of a competitive call for resources to promote new projects linked to Particle Physics activities with a committee including relevant CERN experts to advise on its allocations.

The Committee feels that the realisation of a detector infrastructure ('Pixel Lab') controlled by the Centre and aimed to create an environment specifically devoted to particle physics detectors was and is a key element for the development of Particle Physics in Lithuania. This infrastructure should be properly resourced in terms of person-power: these resources (researchers, post-docs, students) would contribute to the 'Particle Physics' community growth advocated by the CERN Council.

The Committee supports the development of a HPC/Tier2 Baltic structure: such a structure would benefit the Baltic community of Particle Physicists.

The Committee considers a very positive advance the proposed increase of resources outlined in the Action Plan presented by the Ministry of Education, Science and Sport: in the presentation the aspects related to investment in human resources aimed to increase the population of Particle Physicists directly involved in research activities were not outlined explicitly. The Committee recommends that a substantial fraction of the investment in what is identified as R&D, infrastructure and education is devoted to hiring particle physicists, including post-docs, who will be able to provide adequate supervisory resources to mentor students.

The statement was made that the universities involved in the consortium should invest their own funds (starting at 10% and increasing over time): these funds should in priority go towards increasing the Particle Physics community linked to the Centre and the future detector laboratory.