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Advisory Board of the
LHC Physics Center at Fermilab
Batavia, October 24, 2004

Avi Yagil
Fermi National Accelerator Laboratory,
MS 122, P.O. Box 500, Batavia, IL 60510-0500.

Dear Professor Eno and Doctor Yagil:

With this letter the advisory board of the LHC Physics Center (LPC) at Fermilab summarizes its impressions and recommendations from the review of the LPC effort on October 22, 2004.

The board was unanimously impressed by the amount of progress that has been made in the first half year since the foundation of the LPC. Our initial concerns about the success of such a center have been carefully addressed by you and the other LPC members. We are quite encouraged by the excellent support for the foundation of the center from all involved parties, and especially from FNAL. We point out several items of particular relevance:

- From your report, which shows a strong Fermilab involvement in all aspects of the center, and from our visit of the 11th floor in Wilson Hall, we conclude that you have convinced Fermilab of the importance of such an effort. Having a dedicated location where a core of dedicated people can work together closely is fundamental to the success of this enterprise.
- The reports of the subgroups also shows that there is a significant number of people from the universities involved already. The motivation of the LPC is to enable "members" to perform physics analysis in the US and particularly at Fermilab.
- Concerning the acceptance of the LPC by the CMS experiment, one of our main initial reservations, you have done a fine job. All of the reactions reported from the members of the CMS experiment at CERN have been very positive, and the subgroups are well integrated with the CERN efforts. In particular the initiation of workshop meetings and the invitation of key members of the CMS collaboration to Fermilab has been a big success. It is impressive that the subgroups already have made genuine contributions to the CMS experiment as a whole, developing new ideas, providing technical support and producing Monte Carlo samples for simulation and tracking studies.
- The board is pleased that the LPC is focusing its efforts on thorough preparations of physics analyses, starting with a deep understanding of analysis prerequisites such as: the event data model, tracking, trigger, electron/photon reconstruction, muon reconstruction, jet and missing energy reconstruction and general simulation. This modus operandi will make a real contribution to CMS and will certainly be appreciated by the CMS collaboration. Nevertheless, the board stresses that the LPC can only be successful if there is a critical mass of experts in all levels of data processing available locally at Fermilab.

As pointed out above, we are encouraged that this effort has generated good interest and overcome a number of critical issues. However, the board has a number of recommendations for future LPC operations:

- **Critical Mass:** Being able to commit a minimum number of people with a sufficiently well-defined goal was one of the initial concerns of the board. The LPC has developed well in its first six months but is not yet out of the danger zone. It seems that from the side of the laboratory every possible step has been taken except that the group must continue to grow. From the university side the center has reached

the size which was predicted in the initial survey but we would like to see a stronger involvement. We recommend that you keep the recruitment of US universities in CMS for the LPC a high priority. In particular, we refer to those university groups not already involved at Fermilab through DØ or CDF.

- **Appropriate Scope:** Closely related to critical mass is the scope of the LPC effort. Only if the available human resources can adequately carry out the project is critical mass attained. The number of projects the LPC is presently involved in is impressive and good progress has been reported, in general. Nevertheless, it is crucial to the success of the center that all the projects are successful. The board feels in particular that the Jet/MET effort, one of the main opportunities for the LPC, needs to be strengthened. Moreover, the trigger project is quite ambitious and at this point not as strong as desirable. We comment on the trigger project separately in the following paragraph.
- **Trigger Project:** The US has a strong involvement in the CMS trigger project, including several important managerial responsibilities. Given this situation, it seems interesting and appropriate for the LPC to become involved in trigger development, especially since CMS does not have a PRS group dedicated to trigger software. Therefore, there is an opportunity to make substantial and important contribution to the CMS trigger by the LPC trigger group. However, the present effort at LPC looks clearly understaffed. If the LPC decides on a major involvement in this area, the board advises to make sure that sufficient human resources are committed to this project.
- **Clarification of Modus Operandi – TDR Contribution:** It has come up on several occasions that the exact function of the LPC is not yet clear enough with respect to the CMS PRS groups regarding physics analyses. The board believes that people interested in analysis should be pointed to projects in the low level issues of the analysis (*e.g.* the W mass measurement critically depends on the calorimeter linearity), get educated and contribute at the LPC, and then present analyses at PRS meetings. This also clarifies how advisors can get their students involved in the LPC. Concerning the contribution of the LPC to the upcoming physics TDR (volume one), we recommend following this prescription and focus on making solid progress with the reconstruction and tools, and see how much contribution to physics analysis can be made on the way.
- **Preparing for Day One:** Although the major focus of the group is the development of tools for doing analysis, this can best be achieved if there is additionally a concrete analysis goal. We recommend that the LPC identify an analysis which could be used as such a stimulation.
- **Integration with International CMS:** To avoid duplication of effort with the members of CMS stationed at CERN it is important that the LPC collaborates with, and does not attempt to compete with or usurp, international CMS.
- **Organizational Issues:** There are some organizational issues which should be clarified regarding the leaders of the LPC and the various groups. We encourage the LPC heads to write up some minimal constitution which clarifies charge, responsibilities within the LPC, length of terms of the appointed group heads, etc. For convenerships we recommend a model which stagger the terms of the two co-conveners to ensure continuity.

In summary, you have done an excellent job in starting the LHC physics center at Fermilab. The essence of our recommendation is to make sure you continue on the path and keep your main mission in mind: enable US CMS members to do physics analysis at the Fermilab center and the universities.

Sincerely,

The Advisory Board of the LPC