

Memorandum of Agreement

on the Formation of the LCTPC Collaboration

October 2007 / July 2008
Revised June 2016

1 Introduction

1.1 Preamble

A detector concept for the linear collider foresees a time projection chamber (TPC) as the central tracker in a tracking system of high precision and fine granularity combined with a calorimeter system of very fine granularity. The detector is being designed for precision measurements in the electroweak sector and of new HEP-phenomena which might be discovered. One aspect of precision experiments requires the measurement of charged tracks with an order of magnitude better accuracy than at previously built collider-detectors. Another aspect requires the detector to be optimized for the reconstruction of multi-jet final states. The jet energy resolution using the particle-flow technique is best when the reconstruction of individual particles in jets is as complete as possible, meaning efficiency in reconstructing charged tracks is more important for particle flow than momentum precision. A TPC central tracker is being developed to meet these requirements in concert with the other subdetectors. The formation of an R&D collaboration to address these issues is the purpose of this document.

1.2 Scope of the Collaboration

The groups/institutes/laboratories (in the following called 'groups') signing this Memorandum of Agreement (MOA) express their interest to contribute to the goals of the LCTPC collaboration, specifically the development, prototyping and design of a TPC for an experiment at the linear collider. This MOA describes the strategy to achieve those goals and the structure of the LCTPC Collaboration, including the collaboration board, editorial board, speakers bureau, technical board and regional coordinators. An overview of R&D strategy is given in Section 1.3, the policy for becoming a member of the LCTPC collaboration is given in Section 2.1. The responsibilities and assignments of the collaboration board, the spokesperson and regional coordinators, the editorial board, the speakers bureau and the technical board are specified in Sections 3.1, 3.2, 3.3.1, 3.3.2, 3.3.3. The policies concerning finances, publications and legalities are covered in Sections 3.4, 3.3.1, 3.5, 3.6 and 3.7. The groups and the signatories of this MOA are listed in Section 4. The names of the responsible persons in the collaboration and a more detailed description of the R&D program are provided in an *Addendum*, which will be updated regularly as the collaboration and tasks evolve.

1.3 R&D Strategy

The R&D work is proceeding in three phases:

- (1) Demonstration Phase: Finish the on-going exploratory work using “small” ($\phi \sim 30\text{cm}$) prototypes (SP), built and tested by several of the LCTPC groups. This work provided a basic evaluation of the properties of a TPC with Micropattern Gas Detector (MPGD) gas amplification, demonstrating that the requirements for the linear collider can be met.
- (2) Consolidation Phase: Design, build and operate a “Large Prototype” (LP) at the EU-DET facility using low-energy (DESY) and, if possible, high energy beams elsewhere. By “Large” is meant $\sim 1\text{m}$ diameter, so that: first iterations of TPC-design details for the LCTPC can be tested, larger area readout systems can be operated and tracks with a large number of measured points are available for analysis and correction procedures. The tasks have been divided into workpackages listed in the *Appendix*.
- (3) Design Phase: Start work on an engineering design for the final detector. This work in part will overlap with the R&D for the LP, and the final design will start after the LP/SP results allow decisions on technical options.

2 The LCTPC collaboration

2.1 Membership

The LCTPC collaboration (<http://www.lctpc.org>) is open to all groups, which want to join. Any group, which wants to become a member specifies, in an application to the CB-chair, what kind of contribution it will make, alternatively it foresees to make as soon as the financial or manpower situation allows for it. The CB takes note of the contribution/intended contribution. After decision by the CB to accept the group and its contribution, the MoA has to be signed by a representative of the group. The MOA enters into effect upon signature. An accepted group appoints one member to be its representative in the CB. Each group is responsible for keeping an updated list of its members.

2.2 Observer status

Any interested group may obtain observer status. A formal decision is taken by the CB. There are no commitments attached to such groups. Observer groups have no representation in the CB or any other committee of the LCTPC-collaboration, but may be invited to follow the CB-meetings. Observers are included in the LCTPC mailing list.

2.3 Change of status

A change of status might be a desire to leave the collaboration or moving from observer status to regular member or vice versa.

In case a group wants to move from observer status to membership, an application should be sent to the CB-chair and a formal decision is taken by the CB. The group has to sign the MoA.

In case a group wants to step down from membership to observer status, a note should be sent to the CB-chair. The CB takes note of this decision and thereby the MoA expires.

In case a group wants to leave the collaboration, the CB-member of the group sends a letter (mail) to the CB-chair and gives the reason why the group wants to finish its membership. The CB takes note of this decision and thereby the signed MoA expires.

In case a group wants to re-join the collaboration it has to go through the same procedure as for a new member.

3 Organizational Structure

The LCTPC structure consists of management and workpackage bodies.

3.1 Collaboration board

The main governing body of the collaboration is the collaboration board (CB), which consists of the CB-members and the Spokespersons. Each group is represented by one person appointed by the group. In case a group decides to exchange its representative, this should be communicated to the CB-chair.

All major decisions are taken by the CB. The CB should deal with general issues, which concern the collaboration as a whole. Each member can make proposals to the CB, which is obliged to discuss these and take decisions accordingly.

The CB chair person is elected by the CB for a period of two years, with possible extensions. The CB chair person should appoint a deputy chair person to assist him and to step in whenever the chairperson is not available.

CB-meetings can be held whenever necessary but at least in conjunction with the collaboration meetings. Invitations to the CB-meetings are distributed by the CB-chair, well in advance and are chaired by him. The meetings are open to the CB-members, the Spokespersons and others invited. An agenda should be prepared and distributed by the CB-chair in due time prior to the meeting. A list of attendance and voting list (if necessary) should be set up. The CB-chair is responsible for distributing minutes of the meeting.

Each group has one representative in the CB. Normally a decision is taken through acclamation or if the chair person can not identify a clear majority for a proposal, through open voting. In case of personal matters or on request by a CB-member, a secret voting has to be performed. In case a decision is taken via voting each representative has one vote. In case of equal votes the CB-chair has the casting vote. In case of several proposals, the proposal which gets the most votes wins (relative majority).

The Spokespersons have no votes unless they are CB-members.

A quorum for a CB-meeting exists if at least 50% of its members are present. In order for a decision to be mandatory, normally simple majority is required. However, changes of rules in the MoA, admission or removal of groups require 2/3 majority of all CB-members.

In case a CB-representative can not attend a CB-meeting in person, he may appoint somebody to replace him. The CB-chair should be informed who the replacement is prior to the meeting. In urgent cases, the CB can take decisions also by phone/video conference or by electronics voting.

The CB can delegate decision power on certain issues to other boards.

3.2 Regional coordinators (RC) and Spokesperson

One representative from each region (Americas, Asia and Europe) should be proposed as regional coordinator, by a search committee in each region and appointed through an election process in each region. The CB-members of each region set up search committees, which should consist of 2 persons. The result of the regional elections should be communicated to the CB-chair in due time prior to the CB-meeting.

The RCs nominate the Spokesperson among themselves and the other two RCs act as Co-spokepersons. The Co-spokespersons should assist the Spokeperson and step in for him whenever he is not available. The results of the nomination is communicated to the CB. The Spokesperson and the Co-spokespersons are elected for a period of two years, with possible extensions.

The R&D planning and the collaboration meetings are organized by the RCs. They are responsible for tracking the progress of the collaboration, preparing decisions and reporting regularly to the CB.

The Spokepersons are responsible for arranging regular (bi-weekly) meetings, the purpose of which are to continuously follow up the progress of the various Workpackages.

3.3 Additional committees

The CB may set up additional committees of the collaboration whenever it finds it appropriate and necessary. Presently there are the following three committees:

- (1) Editorial Board (EB)

- (2) Speakers Bureau (SB)

- (3) Technical Board (TB)

General rules for meeting of all additional committees should be that an agenda is prepared and distributed in due time prior to the meeting, a list of attendance is made and that minutes are taken and distributed.

3.3.1 Editorial Board (EB)

The members of EB and its chairperson are appointed by decision of the CB for a 2-year term, with possible extensions. The EB should contain members from all three regions.

The EB should oversee and coordinate submission of papers and proceeding reports. It should appoint internal referees for each draft, who should carefully read and comment on the content. When the corresponding author has taken comments and advices of the referees into account, the EB should circulate the draft within the whole collaboration for comments. A deadline for giving comments should be specified. Finally the EB is responsible for the submission of the paper.

The rules for appearing in the author list are:

- 1 An author should be member of a group, which has signed the MoA.
- 2 Everyone who has contributed to the common infrastructure of LCTPC should appear as an author of all published results, which have been obtained using this infrastructure. An LCTPC-member appears in the author list one year after the MoA has been signed and remains in the author list until one year after he has left the collaboration. Exception from this rule can be discussed from case to case and the approval is given by the CB.
- 3 For each paper, each group specifies its author list and communicate this through its CB-member to the EB. In case there are doubts about the composition of the author list, the CB can propose a modification. In case of disagreement a vote with 2/3 majority decides.
Depending on the character of the paper, modifications of the author list may be motivated. Such modifications should be discussed from case to case and an approval has to be given by the CB.

Any changes of the rules have to be ratified by the CB. The EB is responsible for keeping an updated author list.

Publications

All results, relevant to the goals of the LCTPC collaboration, obtained from the work by the members of the LCTPC collaboration will be openly available to all members. Data obtained using jointly constructed prototypes shall be the property of the LCTPC collaboration. The groups agree that they will not publish or make otherwise public any information belonging to LCTPC without obtaining prior agreement of the collaboration. However, prior agreement of the collaboration shall not be imposed on the filing of any student thesis or dissertation. Results from the collaboration will be published under the name “LCTPC Collaboration”.

Data obtained using prototypes or equipment owned and operated by individual member institutions or smaller groups of institutions, which has not become part of the jointly constructed prototype, shall remain the property of those institutions. This applies to data obtained both before and after this MOA is effective. While such data shall be available to all LCTPC members, such data shall not be released outside of the collaboration without the prior approval of the institution(s) owning that data. In case of a conflict the collaborators agree to accept the decision of the CB as final.

3.3.2 Speakers Bureau (SB)

The members of the SB and its chair person is appointed by decision of the CB for a 2-year term, with possible extensions. The SB should contain members from all three regions.

The SB informs the collaboration about conferences of interest and invites the collaborations members to propose presentations and submit abstracts. In case of a general invitation to the LCTPC-collaboration to give a talk, the SB appoints a speaker. The SB organizes rehearsals of invited talks and ensures that slides are distributed within the collaboration. Drafts for proceedings should be circulated within the collaboration for comments before submitted. The SB maintains records of conference presentations.

3.3.3 Technical Board (TB)

The member of the TB are the leaders of the different workpackages, elected through decision by the CB and they constitute contact persons for the various activities within the workpackages. They are charged with coordinating within their respective workpackages, and report on this regularly to the RC and the CB. The various workpackages and the responsible persons are specified in the *Addendum*. Changes to the structure of the work packages can be decided by the CB at any time.

3.4 Finances

The work of the LCTPC collaboration is funded through the individual budgets of its members. Items of common expense will be shared between the collaborators based on a case-by-case agreement. Collaborators agree to provide financial information to the RCs. The information will be treated confidentially if so requested. LCTPC may not impose financial obligations on members without such members' consent.

3.5 Ownership of Equipment

All equipment purchased or fabricated using funds of a member institution remains the property of that member institution and shall be subject to the property management system of that institution. It is the intent of the members that all equipment purchased or fabricated by a member institution and incorporated into the LCTPC prototype or a test facility would remain with the prototype effort or test facility until it is determined by the LCTPC collaboration that such equipment is no longer needed. At that time the property would be returned to that member institution at its expense.

3.6 Warranty

No warranties, express or implied, are conveyed as to any matter whatsoever, including, without limitation, the project or any inventions or results whether tangible or intangible, conceived, discovered, or developed under this agreement or the ownership, merchantability, or fitness for a particular purpose of the project or any such invention or results. Members shall not be liable for any direct, consequential, or other damages suffered by any licensee or any others resulting from the use of the project or any such invention or results.

3.7 Liability

Each party hereby assumes any and all risks of personal injury and property damage attributable to the negligent acts or omissions of that party and the officers, employees, and agents thereof.

4 Institutes

The Institutes which have signed the MoA in 2016 are listed below; CB members and updates will appear in the yearly *Addenda*.

—Americas—	—Asia—	—Europe—
Carleton/Triumf	Tsinghua	Inter U Inst for HEP(ULB-VUB)
Carleton U	Hubei	CEA Saclay
Victoria	Saha Kolkata	Aachen
BNL	Iwate	Bonn
Cornell	KEK	DESY/HH
Indiana	Kinki	Kiev
	Saga	MPI-Munich
	Kogakuin	Rostock
	Nagasaki Inst AS	Siegen
	Tokyo U A & T	Nikhef
		Novosibirsk
		Lund
		CERN

5 Signatories

The following page is the MoA Form to be signed by a responsible authority in each institute.

LCTPC Collaboration Member

Institute:

Address:

Responsible authority:

Date and Signature