Addendum 2008 to the LCTPC MOA: R&D organization

Overview

The status as of November 2008 about R&D responsibilities, structures and plans are outlined in this document. All issues for the TPC performance within the linear collider framework have been described at several reviews since 2001, most recently for the WWS R&D review in LC Note LC-DET-2007-005 at http://flcweb01.desy.de/lcnotes/. The names of LCTPC members will be updated at https://wiki.lepp.cornell.edu/wws/bin/view/Projects/TrackLCTPCcollab.

1 2008 Amendment to the MOA

Following the LCTPC collaboration meeting on 15 November 2008 at the LCWS2008 at the University of Illinois in Chicago, the MOA paragraph §2.5 on Publications has been modified to include a policy for talks to be given on common-equipment (Large Prototype) results. The second paragraph below is new:

> **2.5 Publications**
>
> All results obtained from the work within the LCTPC collaboration will be openly available to all members, and data obtained using common prototypes or common equipment will belong to all collaborators. The groups agree that they will not publish or make otherwise public any information belonging to LCTPC without obtaining prior agreement of the collaboration. Results from the collaboration will be published under the name "LCTPC Collaboration". The CB will install a proper editorial process before releasing material to the public. In case of a conflict the collaborators agree to accept the decision of the CB as final.
>
> Similarly the CB will install a speakers' bureau which will review all talks pertaining to the common equipment. The method may include the organizataion of practice talks which can be reviewed and modified by the speakers' bureau.

2 Responsibilites 2008

2.1 Collaboration Board (CB)

The groups and, in bold, the **CB members** (preliminary, missing MOA signatures are marked by "?") are listed in the following.

–Americas–	
Carleton/Triumf:	**Madhu Dixit**
Carleton U:	**Alain Bellerive**
Montreal?:	**Jean-Pierre Martin**
Victoria:	**Dean Karlen**
BNL:	**Alexei Lebedev**
Cornell:	**Dan Peterson**
Indiana:	**Rick Van Kooten**
LBNL?:	**Dave Nygren**
Louisiana Tech?:	**Lee Sawyer**
–Asia———-	
Tsinghua:	**Yuanning Gao**
For the CDC groups:	**Akira Sugiyama**
Hiroshima?	
KEK	
Kinki	
Saga	
Kogakuin	
JAX Kanagawa?	
Nagasaki Inst AS?	
Tokyo U A & T?	
U Tokyo?	
Mindanao?	
–Europe———-	
Inter U Inst for HEP(ULB-VUB):	**Xavier Janssen**
LAL Orsay/IPN Orsay?:	**NN**
CEA Sacly:	**Paul Colas**
Aachen:	**Stefan Roth**
Bonn:	**Klaus Desch**
DESY:	**Ties Behnke**
UHamburg:	**Ties Behnke**
EUDET:	**Joachim Mnich**
Freiburg?:	**Andreas Bamberger/Markus Schumacher**
Karlsruhe?:	**Thomas Müller**
MPI-Munich:	**Ron Settles**
Rostock:	**Henning Schroeder** (deputy:**Alexander Kaukher**)
Siegen?:	**Ivor Fleck**
Nikhef:	**Jan Timmermans**
Novosibirsk:	**Alexei Buzulutskov**
St.Peterburg?:	**Anatoliy Krivchitch**
Lund:	**Leif Jonsson**
CERN:	**Michael Hauschild** (deputy:**Lucie Linsen**)

2.1.1 New groups

The collaboration is open to all, and the changes in the group-structure are included above and will be updated in future Addenda.

Groups or persons that could not sign the MOA but want to be informed on the progress, thus are included the lctpc mailing list, are: Iowa State, MIT, Purdue, Yale, TU Munich, UMM Krakow, Bucharest.

2.2 Regional Coordinators (RC)

The RCs for 2007/08, after selection of candidates by search committees in each region, were elected by the CB members of the respective region for a two-year period. They are
–Americas: **Dean Karlen**
–Asia: **Takeshi Matsuda**
–Europe: **Ron Settles** (who requested to continue for only one year) in 2007 and
Jan Timmermans in 2008.

Spokesperson selection: The RCs decided not to have a predetermined rotation of RCs as their chairperson and spokesperson for the collaboration; he/she will be chosen by the RCs once per year, and the reasoning for the choice will be explained to the collaboration. Ron Settles had this function in 2007, and Jan Timmermans was voted as Chairperson/Spokesperson for 2008.

2.3 Technical Board (TB)

The present workpackage structure is presented here; the **TB members** are the conveners of the workpackages and are listed in bold) in the following table. Preliminary information (to be confirmed after MOA-signing is completed) about the interests of the groups for the different workpackages is also shown; details of which group does what is in the process of being specified.

Workpackage **Convener**	**Groups involved**
Workpackage (0) TPC R&D Program	LCTPC collaboration
Workpackage (1) Mechanics	
a) LP endplate structure, design **Dan Peterson**	Bonn,Cornell,Desy/HH,MPI,Saclay, +contribution from Eudet
b) Fieldcage, laser, gas **Ties Behnke**	BNL,Desy/HH,Victoria +contribution from Eudet
c) GEM panels for endplate **Akira Sugiyama**	Bonn,Cornell,Desy/HH, Kek/CDC,Tsinghua
d) Micromegas panels for endplate **Paul Colas**	Carleton,Cornell, Saclay,Orsay
e) Pixel panels for endplate **Jan Timmermans**	Bonn,Freiburg,Nikhef,Saclay, +contriubution from Eudet
f) Charge-dispersion-foil for endplate **Madhu Dixit**	Carleton,Saclay,Orsay
Workpackage (2) Electronics	
a) Standard RO/DAQ sytem for LP **Leif Joensson**	Brussels,Cern,Desy/HH,Lund, +contribution from Eudet
b) CMOS RO electronics **Harry van der Graaf**	Nikhef,Saclay, +contribution from Eudet
c) Electronics for LCTPC **Luciano Musa**	Brussels,Cern,Desy/HH,Lund,Rostock Montreal,JAX,Nagasaki,Tsinghua, +contribution from Eudet

Workpackage (3) Software	
a) LP software + simul./reconstr.framework **Martin Killenberg**	Bonn,Cornell,Desy/HH,Victoria, +contribution from Eudet
b) LCTPC simulation/perf./backgrounds **Stefan Roth**	Bonn,Carleton,Cern,Cornell,Desy/HH, Kek/CDC,Victoria
c) Full detector simulation/performance **Keisuke Fujii**	Bonn,Desy/HH,Kek/CDC
Workpackage (4) Calibration	
a) Field map for the LP **Lucie Linsen**	Cern,Desy/HH+contribution from Eudet
b) Alignment **Takeshi Matsuda**	Cern,Desy/HH,Kek/CDC
c) Distortion correction **Dean Karlen**	Victoria
d) Radiation hardness of materials **Anatoliy Krivchitch**	St.Petersburg
e) Gas/HV/Infrastructure for the LP **Klaus Dehmelt**	Aachen,Desy, Victoria, +contribution from Eudet

3 Next R&D Steps, the LP and SPs

3.1 What has been learned

Before addressing plans, a brief overview of what has been learned in the past few years is needed. As described in the MOA, the R&D is proceeding in three phases: (1) Small Prototypes–SP, (2) Large Prototypes–LP and (3) Design.

Up to now during Phase(1),
–about 6 years of MPGD experience has been gathered,
–gas properties have been well measured,
–the best possible point resolution is understood,
–the resistive-anode charge-dispersion technique has been demonstrated,
–CMOS pixel RO technology has been demonstrated,
–the proof of principle of TDC-based electronics has been shown and
–commissioning has started for the LP.

3.2 Next steps

The Phase(2) LP and SP work is expected to take about three years and will be followed by Phase(3), the design of the LCTPC. A scenario for the options in presented in Table 1 which will be updated in future Addenda as the planning progresses.

Regular bi-weekly WP phone meetings started in May 2006 where details for the LP design were worked out and next R&D steps are being developed. The LP is underway, and the groups agree that over the next three years there will be an evolution of endplates towards a true prototype for the LCTPC. An overview of the present planning is:

2009-10 Continue R&D on technologies at LP, SP, pursue simulations, verify performance goals.
2009-11 Plan and do R&D on advanced endcap; power-pulsing, electronics and mechanics are critical issues.
2011-12 Test advanced-endcap prototype at high energy and power-pulsing in high B-field.
2013-18 Design, build LCTPC.

More-detailed scenarios are presented in the following table. The stages are sympolized by LP1, LP1.5, LP2. Supplemental testing with the SPs, which have been used extensively to date as witnessed by Section 3.1, will continue, since there are still several issues to be explored which can be performed more efficiently using small, specialized set-ups. The small-prototype work is driven to a large extent by the needs of the individual labs as seen in the following example.

Table 1: LCTPC R&D Scenarios for Large Prototype and Small Prototypes.

Large Prototype R&D		
Device	Lab(years)	Configuration
LP1	Desy/Eudet(2007-2009)	Fieldcage⊕2 endplates: GEM+pixel, Micromegas+pixel
Purpose: Test construction techniques using ∼10000 Alice/Eudet channels to demonstrate measurement of 6 GeV/c beam momentum over 70cm tracklength, including development of correction procedures.		
LP1.5	Cern/Eudet2(2010)	Fieldcage⊕2 endplates: GEM+pixel, Micromegas+pixel
Purpose: Continue tests using 10000 Alice/Eudet channels to demonstrate measurement of 100GeV beam momentum over 70cm tracklength, in a jet environment and with LC beam structure using LP1.		
LP2	Cern/Eudet2(2011-2012)	Fieldcage⊕endplate: GEM, Micromegas, or pixel
Purpose: Prototype for LCTPC including gating and other options, demonstrate measurement of 100GeV beam momentum over 70cm tracklength, and in jet evironment and LC beam structure, test prototype LCTPC electronics.		

Small Prototype R&D		
Device	Lab(years)	Test
SP1	KEK(2007-2008)	Gas tests, gating configurations
SP2,SP3	Fermilab-Cern(2009-2010)	Performance in jet environment
SPn	LCTPC groups(2008-2012)	Performance, power-pulsing, gas tests, dE/dx measurements, continuation of measurements in progress by groups with small prototypes