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**Minutes of the CLIC Collaboration Meeting  
held at CERN on 19-5-2004**

**Participation :**

Belgium	R. Gastmans
CERN :	R. Aymar, C. Benvenuti, D. Blehschmidt, H. Braun, R. Corsini, J.P. Delahaye, J. Ellis, J. Engelen, G. Geschonke, E. Jensen, P. Lebrun, S. Myers, L. Rinolfi, I. Syratchev, F. Tecker, I. Wilson, W. Wuensch
CIEMAT/Spain	M. Aguilar-Benitez, L. Garcia-Tabarez
Cockroft Institute/UK	J. Dainton
DAPNIA/Saclay	M. Jacquemet, J. Zinn-Justin
Helsinki Institute of Physics	D.O Riska
INFN-LNF	S.Bertolucci, A Ghigo
JINR/Dubna	V. Kekelidze
LAPP/Annecy	J. Colas, Y. Kariotakis
LAL/Orsay	T. Garvey, P. Lavocat
MSL/Stockolm	O. Skeppstedt
NIKHEF/Netherlands	K. Gaemers
NWU/USA	M. Velasco
Poland	T. Kurtyka
RHUL/UK	G. Blair
SLAC/USA	R. Ruth
Strathclyde University/UK	A. Phelps
Uppsala University, Sweden	T. Ekelof

## 1. Introduction (R. Aymar)

The aim of the meeting was to find out the interest of other laboratories in contributing to the present R&D program to reach a conclusion on the technical feasibility of developing CLIC technology by 2010 (as defined in the form of workpackages for CTF3) and of the CLIC study in the future.

R.Aymar summarized CERN's position with respect to discussions on a Global Linear Collider project:

- Every effort will be made to provide LHC colliding beams in the summer of 2007. This is the first priority.
- CERN has to achieve this goal within a tight budget.
- Parallel running of LHC and a linear collider (LC) is considered important by some
- ICFA, ECFA, ACFA, HEPAP recommended to go as fast as possible for developing technology for a 500 GeV colliding beam energy (upgradeable to 1 TeV). Two technologies are being considered, the so-called 'warm' and 'cold' technologies for RF acceleration cavities. An International Technology Recommendation Panel (ITRP) is mandated to make a recommendation before the end of 2004. It is assumed that this recommendation is to be followed by all parties interested/involved in an LC. The USA and Japan are presently developing 'warm' technology and DESY has developed 'cold' technology (TESLA).
- The novel CLIC concept was already proposed (at CERN) in 1986, and is recognized to be the only possible technology for a Multi-TeV Linear Collider if demonstrated to be feasible but it has always been considered as 'futuristic', i.e. for the distant future.
- ESGARD (European Strategy Group for Accelerator R&D with participation of the European labs concerned) has obtained EU support for the CARE proposal, in line with the Commission's strategy to stimulate European initiatives for collaborating on common infrastructures. CARE provides support to, among other subjects, 'generic' studies of issues related to an LC; ESGARD also submitted a Design Study to the EU, called EUROTUV, concentrating on 'generic' LC issues.
- Why an accelerated CLIC R&D program? CLIC used to be a 'CERN-centric' project, 'for later'. The perspective now is, however, such that it is very worthwhile to try and get an answer on the feasibility of CLIC by 2010. First of all because the first LHC results, available by then, might indicate the need for a multi-TeV LC and then CLIC technology is the only way forward. Secondly, an accelerated CLIC R&D program as a collaborative effort of more laboratories other than CERN alone is in line with the strategy of the European Commission, referred to above. Launching such a collaboration, which is quite common for building large detectors, is the aim of this meeting.

## 2. CTF3 (G. Geschonke)

G. Geschonke introduced the CLIC Test Facility (CTF3) aiming at addressing all key issues concerning the feasibility and design optimization which are specific to the CLIC technology. For details, refer to his [presentation](#).

## 3. Overview of Work Packages

H.Braun, R.Corsini, E.Jensen, I.Syratchev, F.Tecker and W.Wuensch presented the various work packages which institutes are invited to take full responsibility for and/or to contribute to by providing resources in the frame of a multi-lateral collaboration. The resources indicated have to be taken as an estimation only and will have to be reviewed by the laboratory who taking responsibility for the corresponding package. For details, refer to their [presentations](#)

## 4. Visit of the Test Facility and the CLIC Hardware development laboratory

## 5. Statements by delegates.

**J. Zinn-Justin (DAPNIA/Saclay/France):** The intention of DAPNIA is to contribute to several work-packages but there was not yet a full evaluation of resources. There is a strong interest in taking responsibility for the WP4 (probe beam linac) in collaboration with LAL and possibly LAPP. In addition, DAPNIA would contribute 1 man-year to WP2.1 (Automated Test-Stand in particular software). It would participate in WP6 (0.5 man-year, beam dynamics of TBL) and in WP7.3 (i.e. study of new materials, at the level of 1 m-y following availability of high vacuum of expertise in Saclay).

**T. Ekelof (Sweden):** A proposal will be submitted to the Swedish Research Council and Wallenberg Foundation with a request for 4.6 MCHF during 4 years for a Swedish contribution to WP2.2 (Two Beam Test Stand) and to the Transfer line TL2 of WP1. The application is supported by Uppsala University, the Svedberg National Accelerator Laboratory (Uppsala) and the Manne Siegbahn National Accelerator Laboratory (Stockholm). Decision is expected by December 2004.

**P. Lavocat (LAL/Orsay/France):** Confirms interest of LAL in participating in the WP4 (200 MeV Linac) in a coordinated effort with DAPNIA and possibly LAPP. A small amount of resources would be possible in '04, '05. Activities could start end '05 early enough for completion of the WP spring '08. For better evaluation of the effort, more technical details are needed on WP4. Final approval will be given by Oct./Nov. '04,

**R. Gastmans (Belgium):** Belgium physicists are presently fully committed to LHC; so that there is no possible contribution of manpower. In addition, time was too short to investigate and organize financial contributions. Supports the program and possible contribution in the future;

**D.O. Riska (Finland):** preparing proposal to involve Finnish industry (material, metal); in WP 7.3 (Structure technology) and possibly in WP1.5 (power converters); The Helsinki Institute of Physics is presently finalizing Delphi project but may redirect resources to CLIC beginning 2005.

**J. Dainton (UK):** introduces the newly established 'Cockroft Institute'. 'Accelerated' CLIC came a little bit too late to be considered at start-up of Institute. However, new bids will be possible in 12-18 months

**K.Gaemers (NIKHEF/Netherlands):** Supports the program but NIKHEF has closed the on-site accelerator. Interest of Technical Universities and positive attitude of Ministry towards financial contribution to CLIC. Decision in Oct/Nov 2004.

**M. Aguilar-Benitez (Spain):** Little experience with accelerator technology. Ciemat contacted several groups in Spain which expressed the wish to contribute especially to WP1.2 (Magnets of CR), WP1.5 (Power supplies of CR), WP9 (30 GHz stand alone power source). The level of contributions has still to be decided. More technical information is needed in the coming weeks.

**S. Bertolucci (LNF/INFN/Italy):** LNF is already a major partner in the present CTF3 collaboration. It already started the design of the Combiner Ring (WP1.1) and will finalize it (one more man-year). LNF will also take care of the WP1.3 (Vacuum chambers of the CR and Transfer Lines) with a special technology in Aluminium for which LNF has the expertise and which has already been adopted for the Delay Loop. (0.7 MSF plus couple of man-years). LNF will also provide the beam position monitors of the combiner ring and transfer lines (WP1.4).

**J. Colas (LAPP/Annecy/France):** LAPP is presently fully 'booked' with LHC detector construction.

A contribution of LAPP to stabilization and alignment is envisaged for WP4 (200 MeV Linac) in collaboration with LAL and DAPNIA and possibly in WP6 (TBL).

**W.Kalbreier (CERN representing Lure reporting a visit to Orsay):** Following the shut-down of Super ACO, components become available (32 quadrupoles and possibly some power supplies) and could be used to reduce the WP1.2 and WP1.5. This requires a formal request from the CERN DG to Lure.

**G. Blair (Royal Holloway/UK):** confirms the situation as sketched by J. Dainton. Expresses interest in beam simulation of TBL (WP6).

**M. Velasco (North Western University/USA):** Already participating in the present CTF3 collaboration. Interested to extend collaboration on beam diagnostics especially of WP6 (TBL). Looking for broader alliances in Illinois (ANL, FNAL)

**R. Ruth (SLAC/USA):** Refers to letter by Orbach (DOE), Turner (NSF) for USA official position. He is sent as US observer and cannot make commitments although he is personally interested. R.Ruth reminds us that SLAC already contributed to the CTF3 injector and emphasizes common R&D subjects of interest between NLC and CLIC such as high gradient accelerating structures. J.-P. Delahaye points out that the WP2.3 (30 GHz pulse compressor) is critical in order to be able to test accelerating structures with nominal parameters as soon as possible. The expertise is available at SLAC following developments for NLC and therefore SLAC is the ideal laboratory to take responsibility for WP2.3. A SLAC and possibly FNAL contribution to accelerating structure developments, with many common key issues between NLC and CLIC, would be highly appreciated. R. Ruth is invited to forward this message to DOE/NSF.

**A. Phelps (Strathclyde University/UK):** Expertise available in very high power RF sources, such as the 30 GHz stand-alone power source (WP9). Need to put together bid with industry. Will apply for funding if team can be put together which would take about 6 months. A possible delivery would take about two years from bid acceptance.

**V. Kekelidze (JINR/Dubna):** is interested in WP7.3 (30 GHz stand alone power source); funding is the question; will know more in November

**T.Kurtyka (Poland):** there is interest from physicists and engineers of various institutes in 'small' projects; should be able to make more precise proposals relatively soon

**R. Aymar** emphasizes that the most urgent item for the short term is the Combiner Ring (WP1) with components to be ordered this year. There is some more time to discuss the other items.

Next steps:

- Technical meetings focused on the subject of interest will be organized between the CLIC team and the interested laboratories in order to better define the work and the corresponding resources.
- Quest for resources by the institutes to their funding agency
- a Memorandum of Understanding of a multi-lateral collaboration will be circulated as a draft. (However some components of the Combiner Ring which are on the critical path cannot wait for that).

By the end of the year another meeting will be organized in order to:

- review the participation of the various laboratories following the response of the corresponding funding agencies.
- Agree and possibly sign a common memo of understanding

## 6. Summary

A table summarizing the expressions of interest of the various laboratories is presented by J.P.Delahaye (annex).

## 7. Documentation

General documentation on the CLIC collaboration meeting can be found on the corresponding WWW site below:

<http://clic-collaboration-meeting.web.cern.ch/clic-collaboration-meeting/>

## Annex: Expression of interest to participate to CTF3 completion programme

Work Packages		Schedule	Resources		Participation			Comment
			MF	my	Laboratory	MF	my	
<b>1. Combiner Ring (CR), Transfer Line (TL1) Transfer Line (TL2) Bunch compressor</b>	<b>1.1 Optics layout</b>	Ready for Installat.	0	1	LNF	0	1	32 quadrupoles
	<b>1.2 Magnets</b>		1.85	4	CIEMAT LURE	? -	? -	
	<b>1.3 Vacuum system</b>		0.7	2	LNF	0.7	2	
	<b>1.4 Beam diagnostic equip.</b>		0.53	1	LNF	? ?	? ?	
	<b>1.5 Power converters</b>	TL1+ CR end 2005	1.16	1.8	CIEMAT HELSINSKI Institute LURE	? ? ?	? ? ?	To be confirmed
	<b>1.6 Techn. services &amp; instal.</b>	TL2: End 2006	1.05	2	CERN	1	2	Budget not available
	<b>1.7 Control &amp; software</b>		0.1	1				
	<b>1.8 Fast kicker &amp; HV pulser</b>		0.24	1	CIEMAT	? ?	? ?	
	<b>1.9 RF distribution system</b>		0.1	0.2				
		<b>TL2 transfer line</b>			SWEDEN LNF	1.5 ?	6 ?	Swedish. R.C. budget? Vacuum chambers
<b>2. 30 GHz RF power test stands</b>	<b>2.1 Automated test stand</b>	2005-07	2.9	11	DAPNIA SWEDEN	0 0	1 2	Software Swedish. R.C. budget?
	<b>2.2 Two-Beam test stand</b>	2007			SWEDEN	0.9	4	Swedish. R.C. budget?
	<b>2.3 30 GHz RF pulse comp.</b>	2005	(0.15)	(1)	SLAC?	? ?	? ?	DOE-NSF approval?
<b>3. CLEX building</b>		2006	1	2	CERN	1	2	Budget not available
<b>4. Probe beam linac</b>		2006-07	1.6	9	LAL DAPNIA LAPP	1.6	9	Co-responsibility of three laboratories
<b>5. CLIC linac unit</b>		2006-07	1.5	8	LAPP?	? ?	? ?	Alignment
<b>6. 35 A Test Beam Line</b>		2007-08	1	8	DAPNIA NWU RHUL	0 ? ?	0.5 ? ?	Beam dynamics Beam diagnostics
<b>7. 30 GHz structure development</b>	<b>7.1 Accel. structure devel</b>	2005-08	-	-	SLAC? - FNAL?			DOE-NSF approval?
	<b>7.2 PETS development</b>	2004-09	2.5	7				
	<b>7.3 Structure technology</b>	2005-08	0.5	12	DAPNIA FINLAND SLAC?	0 ? ?	1 ? ?	U.H.V. DOE-NSF approval?
<b>8. CFT3 operation</b>		2004-09	0.5	25				
<b>9. 30GHz pow source</b>		2007	10	6	STRATHCLYDE CIEMAT	? ?	? ?	SC solenoid
<b>Special contribution</b>					NETHERLAND	? -	-	To be defined Oct 04