CLIC - CDR Status (Volume 2)

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→ Volume 2

- **CDR in 3 volumes:**
  1: Executive summary
  2: Accelerator and site facilities
  3: Physics and Detectors
- **Volume 1 (some 40 pages) will be written after almost completion of volume 2 and 3 (spring 2011)**
- **Volume 3 was covered by Marcel Stanitzki**
- **This talk is on volume 2:**

Outline

- **Volume 2 outline**
- **CDR Timescale & Strategy**
- **Baseline review in Spring 2010**
- **Present state of document**

Layout of Volume 2

1) Overview of the CLIC concept;
   Details on CLIC feasibility demonstration

2) Accelerator Physics description of the Main Beam Complex

3) Accelerator Physics description of the Drive Beam Complex

} 3 TeV

4) Preliminary design of a 500 GeV intermediate stage

5) Detailed description of the accelerator components

6) Civil Engineering and Services

⟺ Specifications

7) CLIC technologies demonstrated in CTF3

8) Construction and Operational Scenarios

9) Energy Scanning

10) Detailed value estimate

General Comments for volume 2:

- The CDR is based on the CLIC 3 TeV option as baseline for the optimization of the parameters (single step construction).
- Implications of Construction staging starting from the lowest demanded energy as indicated by LHC results (500 Gev) up to the full 3 TeV machine described in separate chapter.
  Parameter changes and optimization for this “500 GeV” machine plus additional consequences for later energy upgrades in the same chapter.
- Total power consumption; discussion of various scenarios from highest possible energy/luminosity to intermediate proposals in a specific chapter of volume 2
- Energy scanning: For the two construction stages (500 GeV and 3TeV) a presentation of the expected performance and optimised running scenarios for an energy variation of at least a factor two again as separate chapter of volume 2.
- CTF3 results: CLIC technologies as demonstrated by CTF3 experiments will be highlighted in a separate chapter

Time Scale …as shown last workshop

- Time-Scale:
  - author lists, general information letter:
  February 2010 → May 2010
  - Publication of changes to CLIC baseline:
  End March 2010 Done, needs to be finished
  - Progressive redaction:
  April 2010 – late summer 2010 Started in September
  - First draft of CDR (vol 1&2):
  LC workshop at CERN in October 2010 I will show what we have
  - Almost complete draft Vol 2 for
  CERN SPC in December 2010 Probably not
  - Final CDR: Spring 2011

Yes, April 2011 we want Volume 2 to be finished

People involved

- management of author-lists:
  A.Augier(CERN), M.Draper (CERN)

- final Latex processing:
  M.Draper(CERN), D.Manglunki (CERN), H.Schmickler (CERN)

- intl. editorial board:
  N.Phinney (SLAC), N.Toge (KEK), P.Lebrun(CERN), H.Schmickler(CERN)

- - authors:
  i) responsible author: responsible for submission in time
  ii) contributing author: active contribution to write-up
  iii) supporting author: “signing-up” through a web-portal as CDR author

  present layout: about 50 responsible authors, mainly CERN, plus another large number of contributing authors from Collaborations/CERN

CDR website

http://project-clic-cdr.web.cern.ch/project-CLIC-CDR/

Contains:

1) a dryrun (12 submissions from summer for tests of software and as reading material for authors)
2) the CDR skeleton (breakdown of document in 4 levels)
3) a regularly updated draft version of the CDR
4) a full table of the expected contributions and a link to preliminary material provided by the authors

Baseline parameter Review (1/5)

Item	Baseline	Alternative	Comments (TBS=To Be Studied)	Resp.
General	Capability of whole complex to run at 100 Hz (70% DB current, 70 % DB energy			
	Capability of whole complex to run at 50 Hz (longer pulse, less charge per bunch)		To maintain luminosity during energy scan	
	Tunnel diameter 4.5 m with transverse ventilation	Longitudinal ventilation and other tunnel diameter	Allow space for electronics and limit heat dissipation to 150W/m	
	Angle of tunnels to 18.8 mradian		Net BDS bend angle	
	Instrumentation requires full performance at ½ charge and half number of bunches			
	phase reference using outgoing beam as reference and/or distributed external timing		Performance to be evaluated in TDR phase	
	Machine protection: based on next pulse permit (post mortem analysis of previous pulse before enabling next pulse; “fault free” equipment for 2ms); masks for fast intra pulse losses			

Adopted for CDR, Envisaged for CDR after additional work (responsible), Alternative to be mentioned in CDR

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Baseline parameter Review

3.5m

MDI / BDS	Tune-up dump at entrance of BDS			
	L* = 3.8m (detector length +-6m)	L* = 6 or 8 m		
	FF quadrupole: PM tunable for small changes and replaced for larger energy variations	SC quadrupoles		
	FF supported by cantilever from tunnel	for L* 6m or 8m FF attached to floor		
	maximum detector field 5T			
	no antiDID			
	Solenoid compensation			
	feedforward on IP using sensors on IP quadrupoles		study needed	
	Fully integrate mechanical feedback and beam based feedback/feedforward		Needs sensors with absolute calibration and low noise	
	Momentum collimation before betatron collimation	Vice versa		
	Intra-pulse feedback at IP		To incr. stabilisation specification by factor 2	

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Baseline parameter Review

Main Beam injector complex	Two positron targets for e+ at 500 GeV and 3 TeV			
	Injector linac from 2 to 1 GHz ? Injector linac with 2 GHz RF frequency			Steffen Doebert
	DR frequency from 2 to 1 GHz ? Damping Ring: RF cavity @ 1 GHz	2 GHz if beam loading can be managed	Pending feasibility of train inter-leave at DR exit within required stability	Steffen Doebert Daniel Schulte
	Damping Ring energy to 2.86 GeV			
	Booster linac adopt new position			
	Booster linac lattice from triplets to FODO		Adapt layout	
	Booster linac and transfer to ML at 8 or 9 GeV? Booster linac and transfer to ML at 9 GeV			Franck Stulle
	Booster linac RF frequency at 1, 2 or 4 GHz? Booster linac with 2 GHz RF frequency			Steffen Doebert Daniel Schulte

Still in work

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What next?

- Close parameter baseline for CDR
- Give authors time to write now
- Contribution chasing will start in November after LC school
- Need 3 months for editing
- April 2011 is still a sensible deadline for final draft of volume 2