MDI Status

MDI/I (FFIR) meeting agenda/minutes（日本語）

http://ilcagenda.linearcollider.org/categoryDisplay.py?categId=103

ILD MDI Working Group Meeting Agenda

http://ilcagenda.linearcollider.org/categoryDisplay.py?categId=130

BDS Meeting, IR Interface Document, Agenda

http://ilcagenda.linearcollider.org/categoryDisplay.py?categId=9

T. Tauchi, 30th May 2008

Since the last monthly meeting;

- Plan and preparation for ECFA-LC workshop

ILD1 : MDI/Integration (FFIR) meetings

23 May 08 ; CAL integration issues
Self-shield property of CMS style GLDc
Wakefield, heating in updated beam pipe
IR Interface Document for EPAC2008

ILD : MDI/Integration meetings (Webex)

23 May 08 ; progress reports, plan at ECFA 2008

BDS/MDI meetings

14 May 08 ; Discuss draft of the IR interface document

Y. Suetsugu: Beam pipe design

Estimation of wakefield in the LDC cone beam pipe
- its strength and possible location of vacuum pumps

T. Abe: Background in IR

- estimation of minimum thickness of W-support tube
- vacuum at IP, 10n or 1n Torr, including hadron production in residual gas interaction

T. Sanami: Self-shielding property of ILD

CMS like structure : 3 rings with 5cm gap in barrel and
2.5cm gap to endcap 2 rings

Pacman performance

T. Okugi: Re-commissioning at push-pull

- estimation of time (flight simulation ?)

Y. Iwashita: Permanent magnet QD0

Future works

1. IR

M. Kawai, 3D Field calculation with anti-DID

2. Integration

K. Tsuchiya, joint cryo-system (detector solenoid, QD0 ?)

H. Yamaoka, QD0 support system and detector integration

3. Push pull

S. Kuroda, Optics of L*=4.5m from one of L*=3.5m

ILD2 status in Europe

DESY by K.Busser

CAD system start up, but impossible to get CATIA at DESY

Start engineering - what need to be done, determined

- design of Iron yoke, its strength and solution for CMS style structures
    - dynamic forces of magnets
    - how to connect 3 rings and 2 endcaps within mm for reproducibility
    - concrete needed for radiation shielding ?
- platform or not, since the platform can save 2m deep space

"We" would like to establish to convert the CATIA to DESY for engineers to be interested instability calculations.

4 or 5 engineers ; 1 + construction dep. CAD-EDMS system at DESY

- they are all involved in XFEL project.

A regular meeting at DESY , Wed,. 13:00- , teleconference

France by H.Videau, J.Matthiews

Calculation of field at Saclay, will work with Karsten for iron yoke
- CAD data is not used for the field calculation.

Calorimetry
"We" would like to exchange with different ideas.
on 15 May, listing items for how to integrate calorimeters
We will discuss on a choice of absorbers (SUS, brass?),
residual magnetic field,CMS-like assembly,
We will also discuss on the cost.
There are different solutions - mechanical design, technical solutions
8 fold or 12 -fold symmetry - how to hang up H-CAL
Towards a common design, we will discuss them in Pairs and Warsaw.

STEP files have been uploaded on the homepage (www.ilcild.org)
complete model of ILD-L1
the Return Yoke for ILD-1&&2 (proposal)
the last beam pipe design around the IP

IR Interface Documents

Motivation : push-pull scheme and 2 detectors in a single experimental hall, i.e. one IP

Goal : track of the achieved agreements and assumption between machine and detector, and focus the efforts for their resolution

paper to be submitted to PAC2008, 6/23-27

CHALLENGES AND CONCEPTS FOR DESIGN OF AN INTERACTION REGION WITH PUSH-PULL ARRANGEMENT OF DETECTORS – AN INTERFACE DOCUMENT*

B.Parker (BNL), A.Herve, J.Osborne (CERN), A.Mikhailichenko (Cornell Univ.), K.Buesser (DESY), B.Ashmanskas, V.Kuchler, N.Mokhov (Fermilab), A.Enomoto, Y.Sugimoto, T.Tauchi, K.Tsuchiya (KEK), J.Weisend (NSF), P.Burrows (Oxford Univ.), T.Markiewicz, M.Oriunno, A.Seryi, M.Sullivan (SLAC), D.Angal-Kalinin (STFC), T.Sanuki, H.Yamamoto (Tohoku Univ.)

Minimum Functional Requirements

(1) Speed of push-pull operation

a few days, or less than a week, which includes time from the switch-off the beam until the moment when luminosity is restored to 70% level and at the same energy, after the detector exchange, but not includes detector calibration time.

(2) QD0 : L* is from 3.5m to 4.5m

QF1 : 9.5m from IP - the hall width

(3) Detector garage position : 15m from IP

detector : radiation and magnetic environment suitable for people's access during beam collision

(4) IR and detector : satisfy the beam parameters of nominal, Low N(Q), Large Y and LowP in the RDR

Beam Parameters in RDR

TABLE 2.1-2
Beam and IP Parameters for 500 GeV cms.

Parameter	Symbol/Units	Nominal	Low N	Large Y	Low P
Repetition rate	f_{rep} (Hz)	5	5	5	5
Number of particles per bunch	N (10^{10})	2	1	2	2
Number of bunches per pulse	n_b	2625	5120	2625	1320
Bunch interval in the Main Linac	t_b (ns)	369.2	189.2	369.2	480.0
in units of RF buckets		480	246	480	624
Average beam current in pulse	I_{ave} (mA)	9.0	9.0	9.0	6.8
Normalized emittance at IP	$\gamma\epsilon_x^*$ (mm·mrad)	10	10	10	10
Normalized emittance at IP	$\gamma\epsilon_y^*$ (mm·mrad)	0.04	0.03	0.08	0.036
Beta function at IP	β_x^* (mm)	20	11	11	11
Beta function at IP	β_y^* (mm)	0.4	0.2	0.6	0.2
R.m.s. beam size at IP	σ_x^* (nm)	639	474	474	474
R.m.s. beam size at IP	σ_y^* (nm)	5.7	3.5	9.9	3.8
R.m.s. bunch length	σ_z (μm)	300	200	500	200
Disruption parameter	D_x	0.17	0.11	0.52	0.21
Disruption parameter	D_y	19.4	14.6	24.9	26.1
Beamstrahlung parameter	Υ_{ave}	0.048	0.050	0.038	0.097
Energy loss by beamstrahlung	δ_{BS}	0.024	0.017	0.027	0.055
Number of beamstrahlung photons	n_γ	1.32	0.91	1.77	1.72
Luminosity enhancement factor	H_D	1.71	1.48	2.18	1.64
Geometric luminosity	$\mathcal{L}_{geo}$ $10^{34}/\text{cm}^2/\text{s}$	1.20	1.35	0.94	1.21
Luminosity	$\mathcal{L}$ $10^{34}/\text{cm}^2/\text{s}$	2	2	2	2

Interface Specifications

1-1. Super-Conducting Final Doublets

(1) 2 cryostats : QD0/SD0 and QF1/SF1

(2) QD0 cryostat is specific for the detector

(3) QF1 cryostat is common and rests in the tunnel

1-2. Cryogenic System of QD0

(1) Service cryostat outside of PACMAN
1 Bar He-II and current leads are provided in cryo-line
They are moved with detector during push-pull operation.

(2) The service cryostat is connected to cryo-system via flexible line containing LHe single phase supply and low pressure He gas

(3) 15 Watts (14 static + 1 dynamic) load at 1.9K

2. Radiation Shield of Detector

(1) Self-shielded or additional local fixed/movable shielding wall

(2) Nominal operation : < 0.05 mrem/hour near the offline detector

(3) Accident case :

< 25 rem/hour for maximum credible beam

(simultaneous loss of both beams anywhere near IP)

The integrated dose < 100mrem / accident

(4) Remarks

gaps in CMS style assembly and PACMAN at beam line

3. Opening of the detector on the beamline

(1) Opening and closing to be performed in half-a-day

(2) At least 2m of opening should be provided

(3) The detector door is split vertically or not, to be evaluated for;
vacuum chamber design, FD support, cryo-line,
magnetic force acting on end caps etc.

4. Assembly of the detector

(1) Deep site : on surface
crane with several tens of ton capacity in the hall
2000-2500 ton gantry cane in the vertical shaft

(2) Shallow site as alternative
the underground assembly will be evaluated

5. Alignment issues after the push-pull operation

(1) Detector elements would be placed within ±1mm

(2) QD0 cryostat would have its own alignment system of the ±2 mm range for fine alignment.

(3) FD apertures and Vertex apertures need to be aligned to better than ±0.2 mm

(4) The detector would provide to machine
- the means to know the vertex position
- 4 channels for an optical path to each of the QD0 cryostats to perform interferometer triangulation from underneath of the detector.

6. Platform as a basic assumption

(1) 2 platforms of 20 x 20 x 2 m^3 - machine responsibility
(2) It would be designed to limit deformation of its surface to be less than a millimeter during the entire push-pull operation

7. Vacuum Requirements

(1) Vacuum : < 1nTorr within 200m of the IP
except for inside of the detector where it is < 10n Torr.

(residual gas of 62%H_2, 22%CO and 16% CO_2)

(2) It will be investigated further if higher pressure is allowable
in the QD0-QD0 drift.

(3) The detector is responsible for providing space for needed pumps
near the IP, side of QD0, and that the cold bore of the QD0
cryostat is not considered as a free cryo-pump.

8. Magnetic field outside of detector

(1) Assumption : any static field on beam line can be corrected.

(2) Requirements from human safety factor and detector performance

- for people with pacemakers, < 2kG
- < 100G in non-restricted area including near the off-beamline detector

(3) The effect from the off-beamline detector onto the on-beamline detector must limt distortion of magnetic field map of the latter to less than 0.01% anywhere inside its tracking volume.

9. Fire safety issues

(1) non-flammable gas mixtures, cables

(2) safety evacuation passages (small tunnels) around the hall

10. Vibration Stability Requirements

(1) Detector surface on which the FD rests is about 50nm

(2) Assumption : the FD stability is about 100nm