Beam Delivery System

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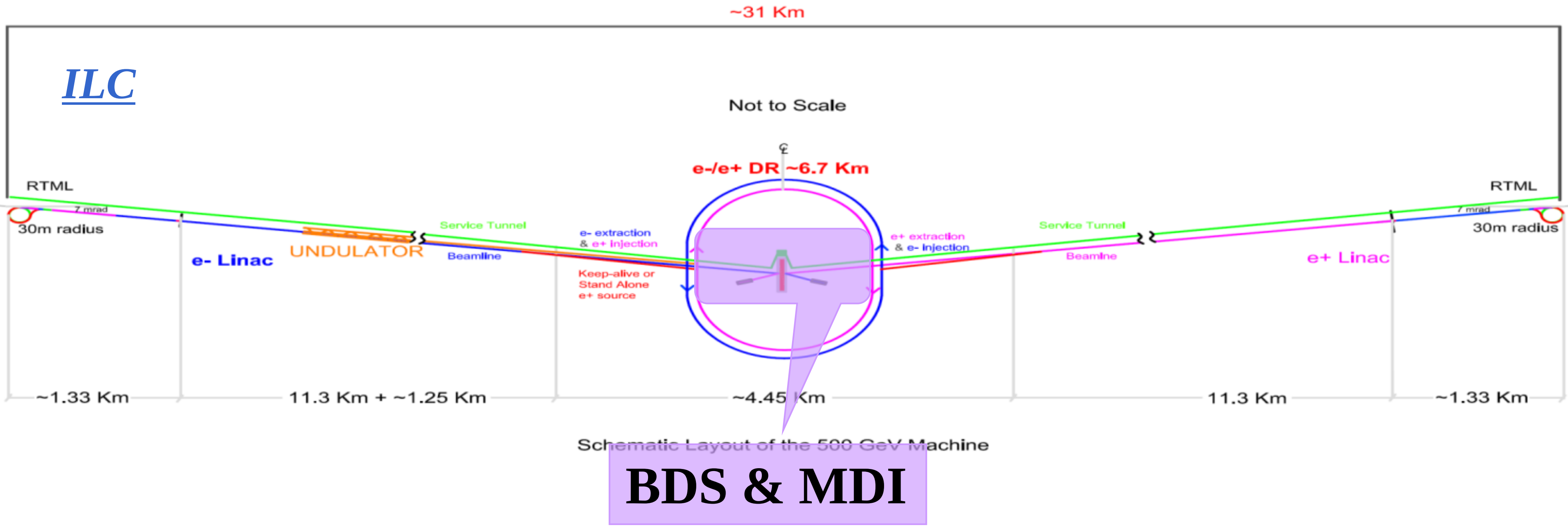
On behalf of GDE BDS team

DOE/NSF Annual ART Program Review
June 9-10, 2010

Plan

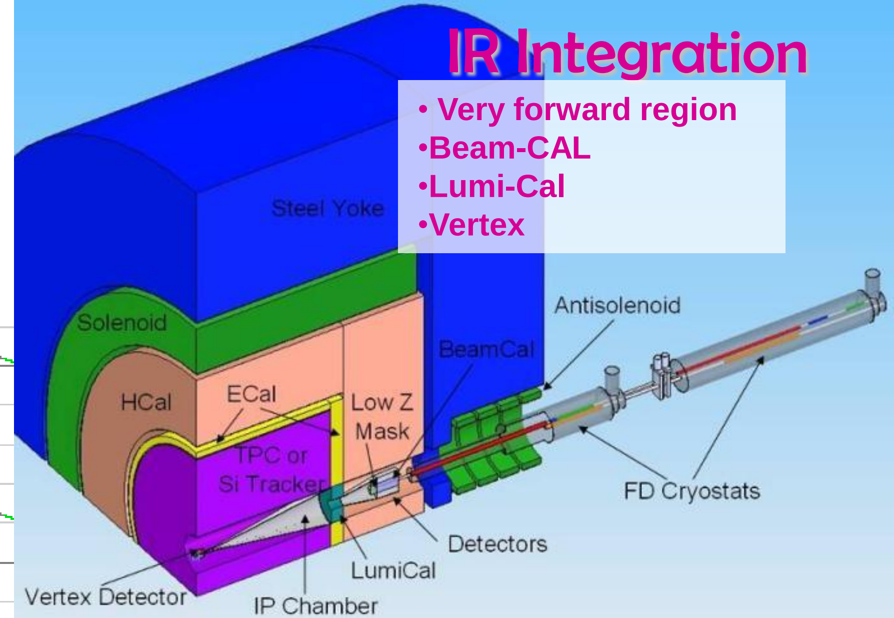
- Overview
- Updates
- Parameters
- ATF2

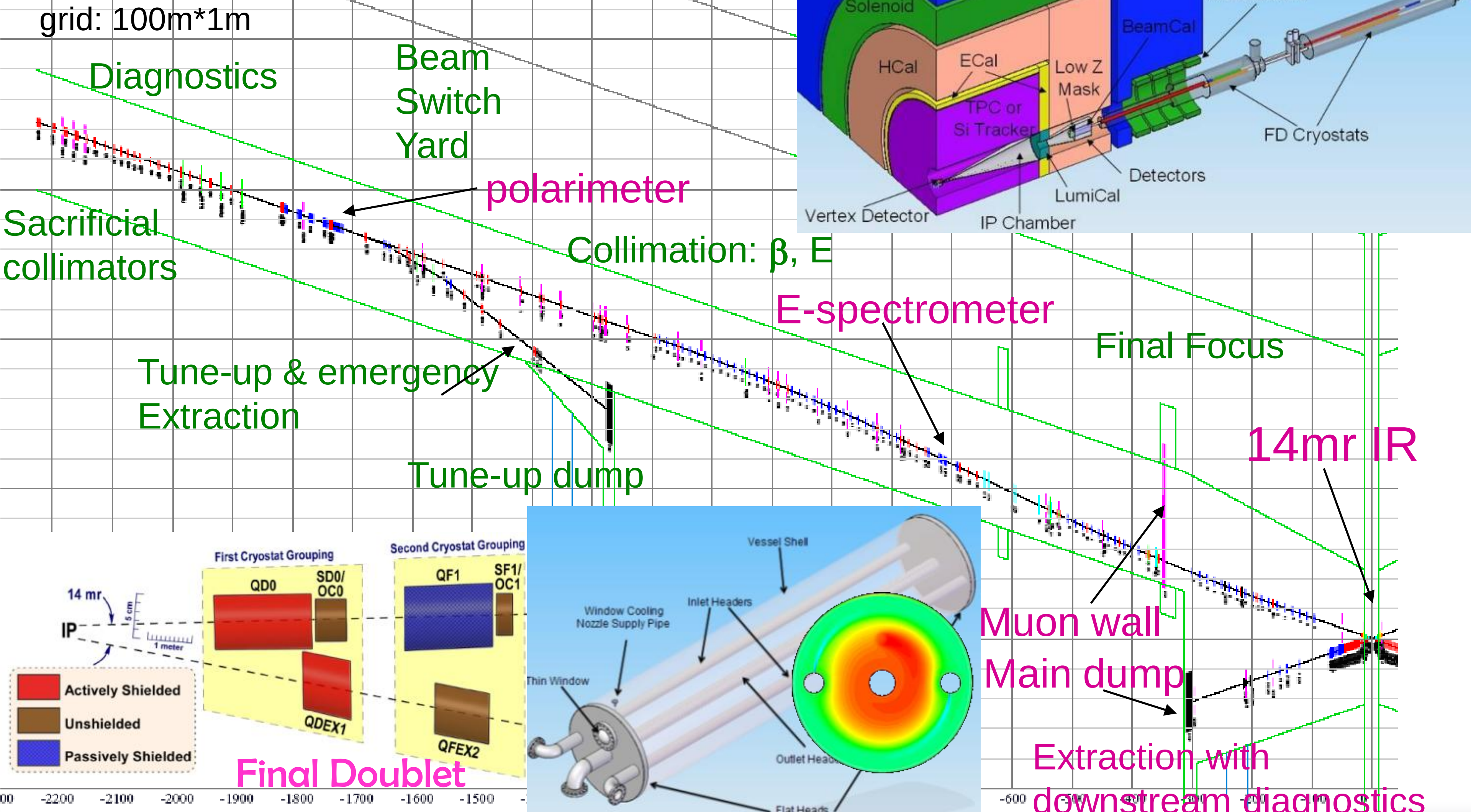
Beam Delivery System & MDI in ILC



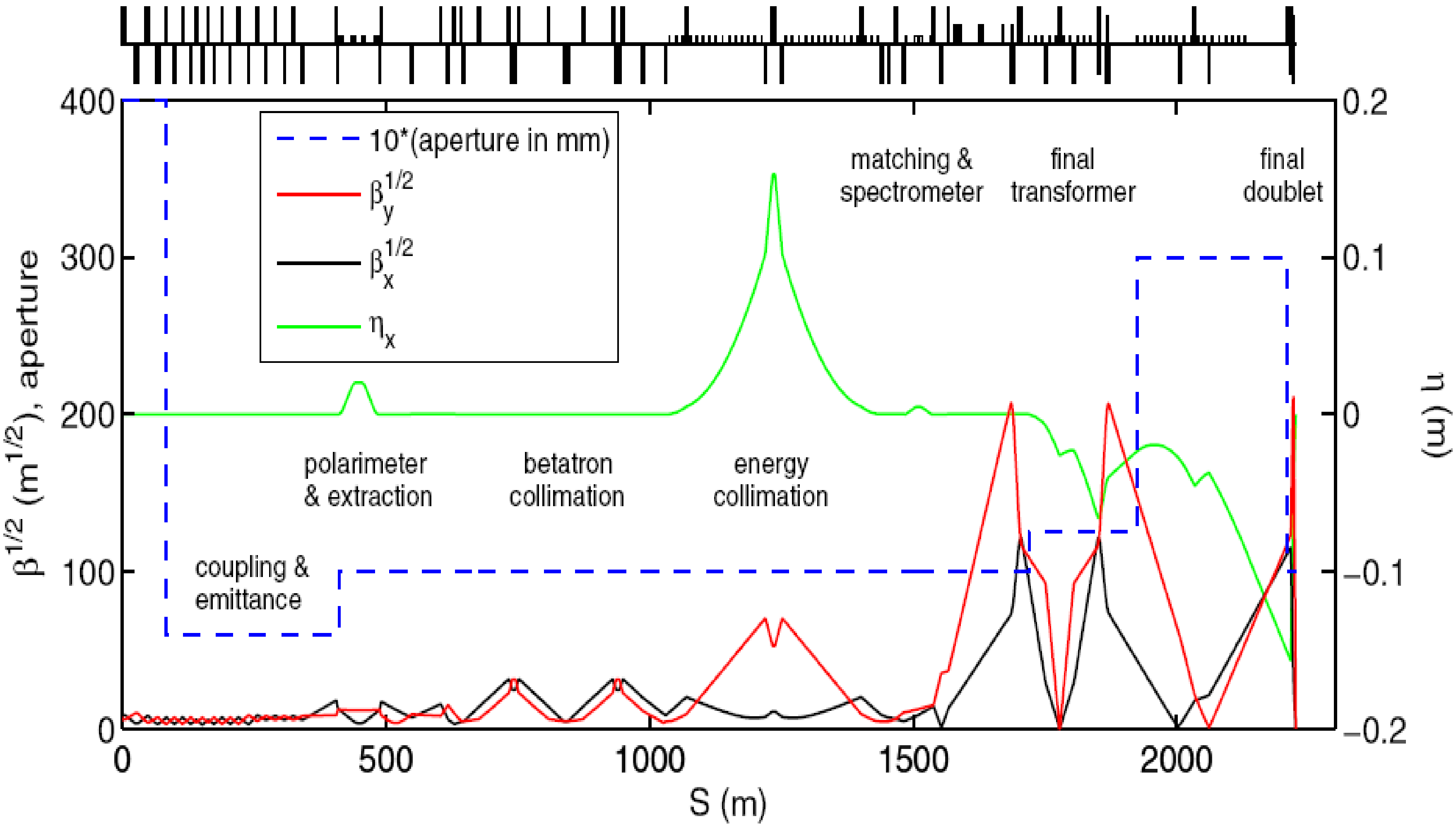
Beam Delivery & MDI elements

1TeV CM, single IR, two detectors, push-pull





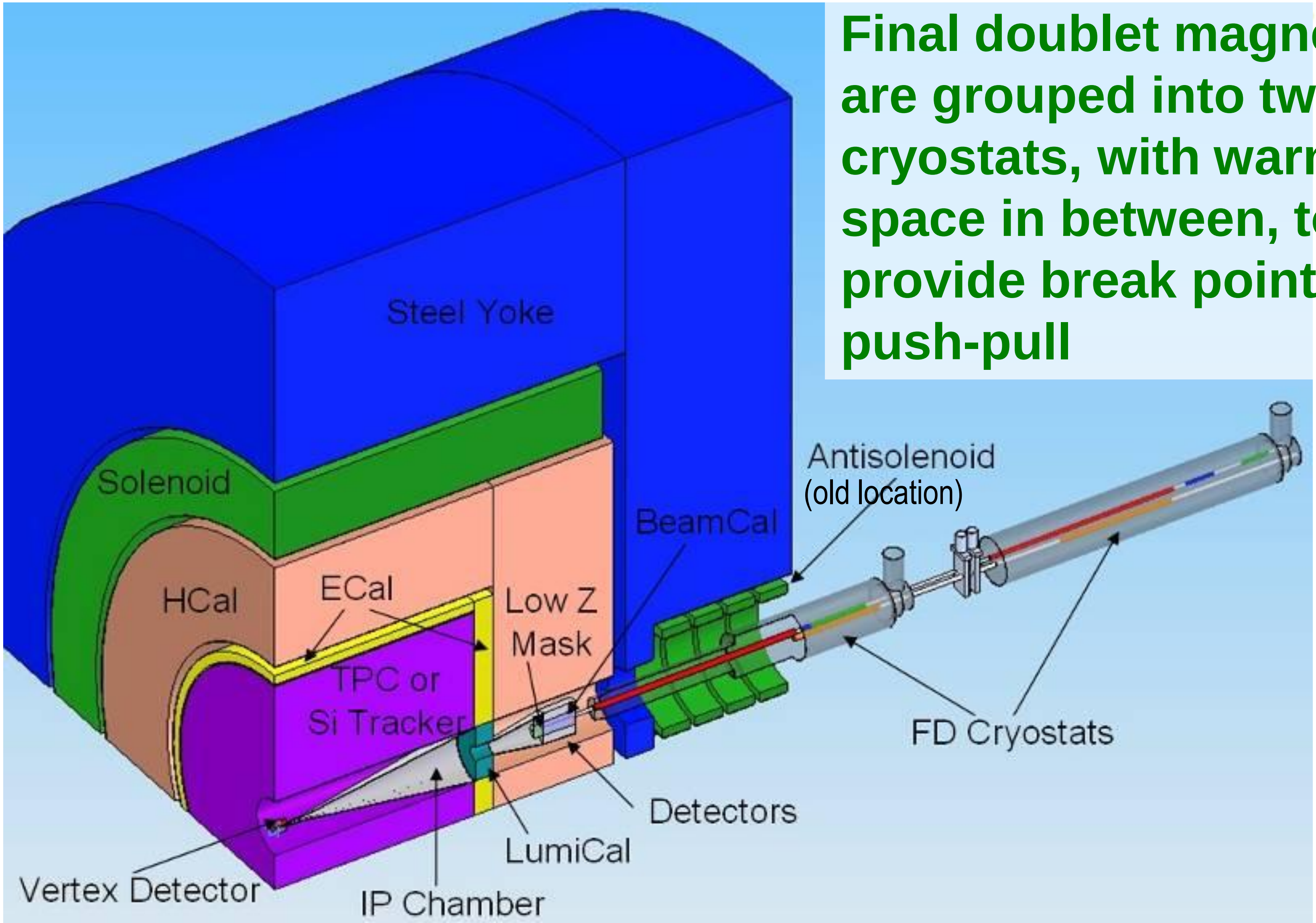
ILC BDS Optical Functions



ILC BDS RDR Parameters

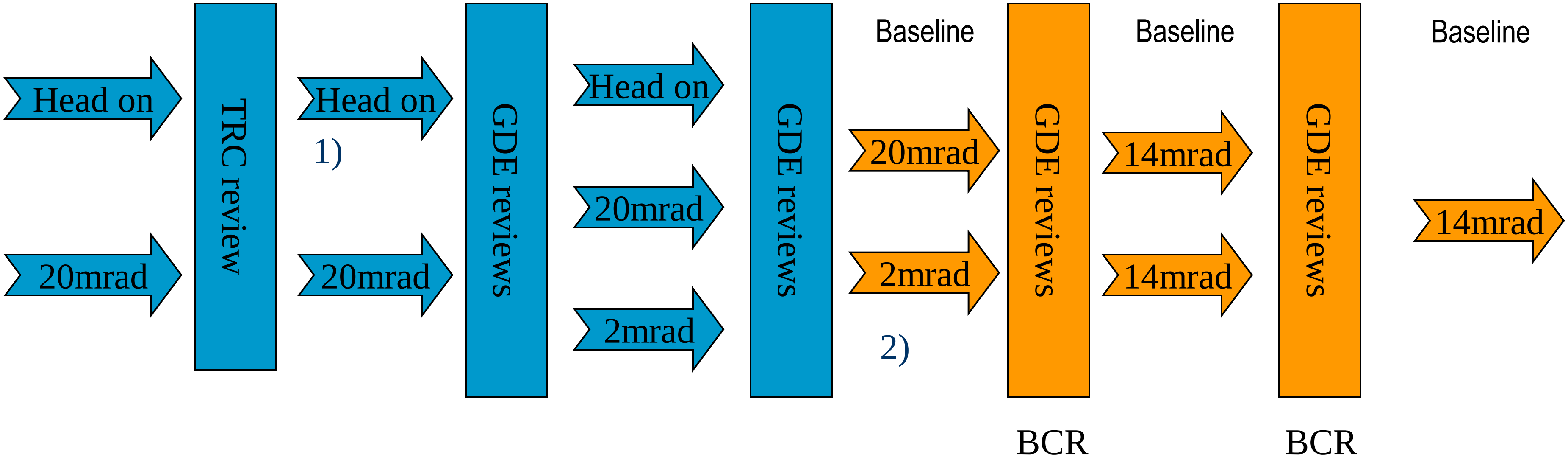
Length (linac exit to IP distance)/side	m	2226
Length of main (tune-up) extraction line	m	300 (467)
Max Energy/beam (with more magnets)	GeV	250 (500)
Distance from IP to first quad, L*	m	3.5-(4.5)
Crossing angle at the IP	mrad	14
Nominal beam size at IP, σ^*, x/y	nm	655/5.7
Nominal beam divergence at IP, θ^*, x/y	μrad	31/14
Nominal beta-function at IP, β^*, x/y	mm	21/0.4
Nominal bunch length, σ_z	μm	300
Nominal disruption parameters, x/y		0.162/18.5
Nominal bunch population, N		2×10^{10}
Max beam power at main and tune-up dumps	MW	18
Preferred entrance train to train jitter	σ	< 0.5
Preferred entrance bunch to bunch jitter	σ	< 0.1
Typical nominal collimation depth, x/y		8–10/60
Vacuum pressure level, near/far from IP	nTorr	1/50

IR integration



Final doublet magnets are grouped into two cryostats, with warm space in between, to provide break point for push-pull

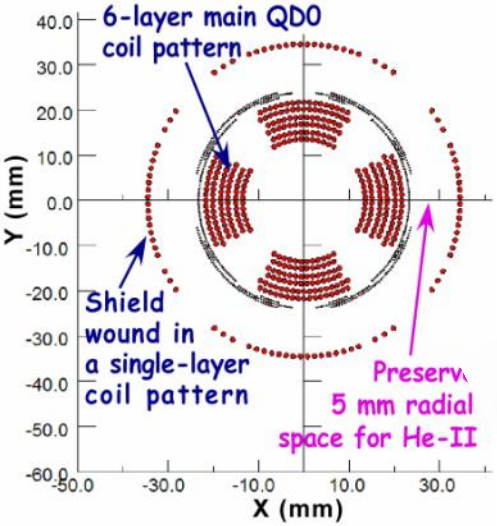
BDS & MDI Configuration Evolution



- **Evolution of BDS MDI configuration**
  - Head on; small crossing angle; large crossing angle

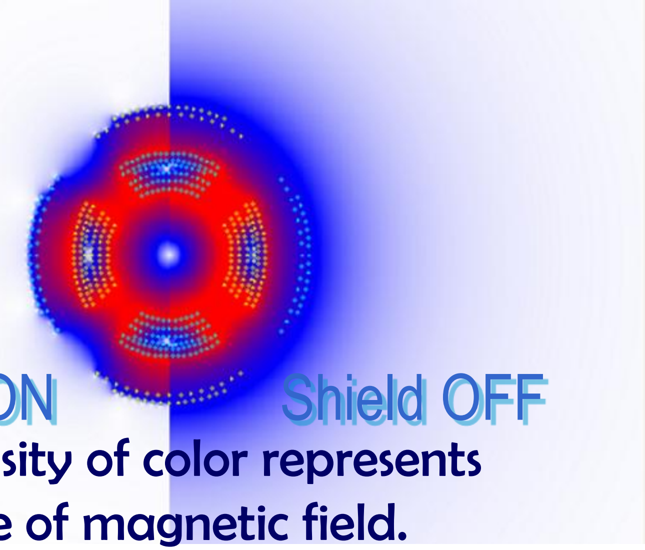
- MDI & Detector performance were the major criteria for selection of more optimal configuration at every review or decision point

1) Found unforeseen losses of beamstrahlung photons on extraction septum blade
2) Identified issues with losses of extracted beam, and its SR; realized cost non-effectiveness of the design

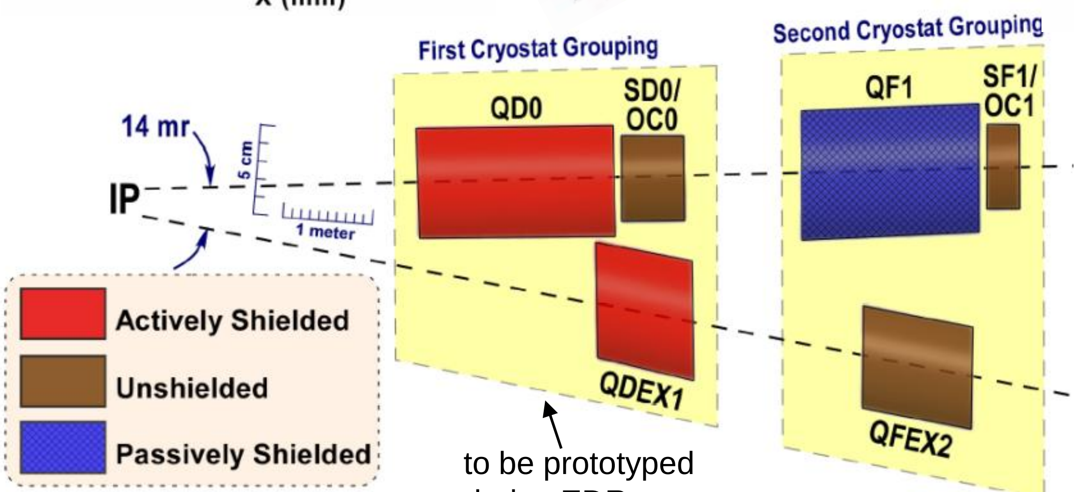


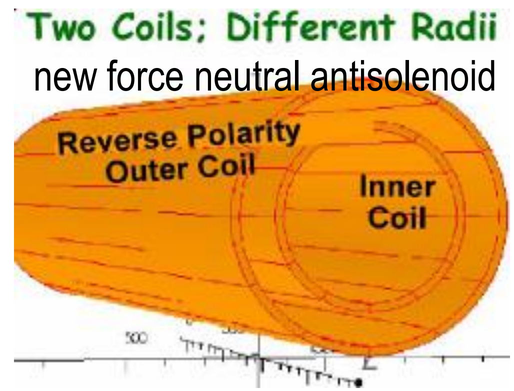
Actively shielded QD0

BNL



Intensity of color represents value of magnetic field.

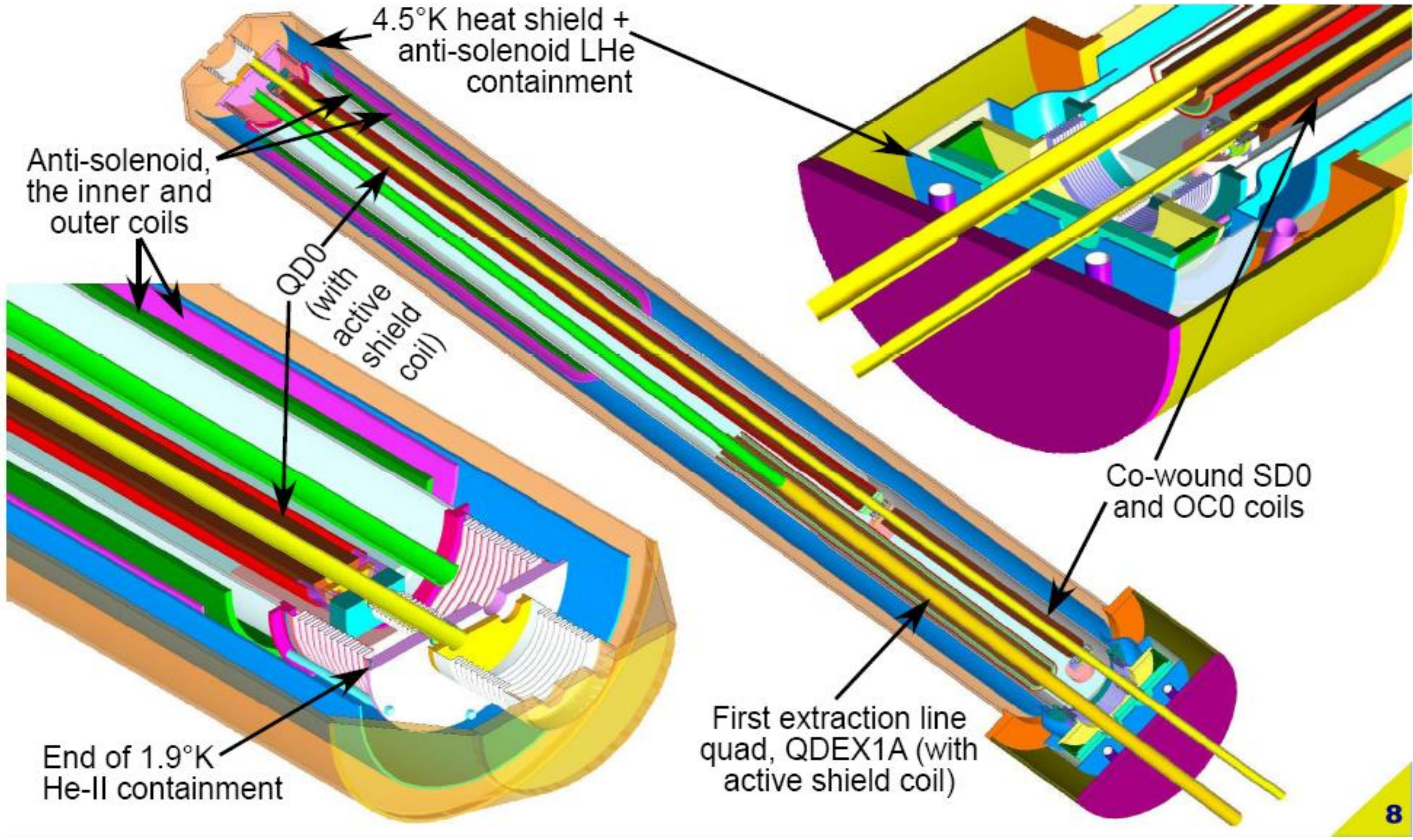


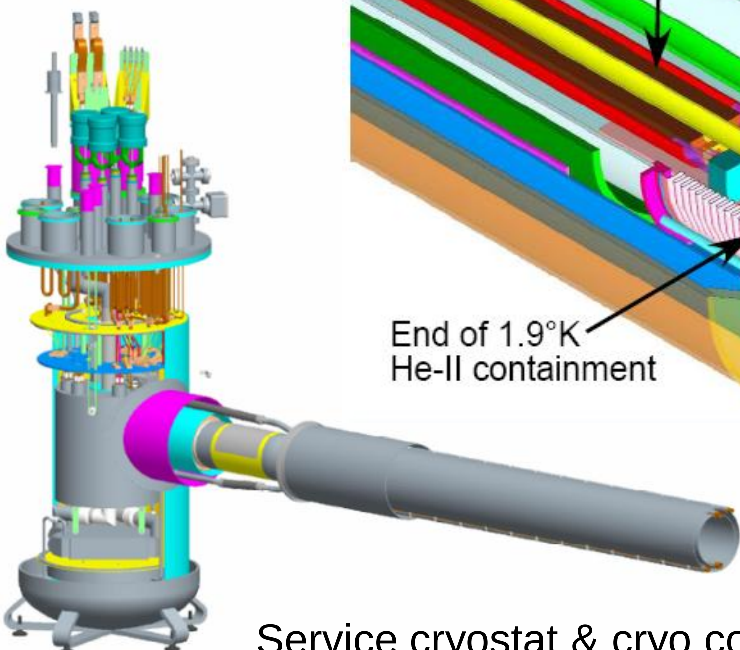


- Interaction region uses compact self-shielding SC magnets
- Independent adjustment of in- & out-going beamlines
- Force-neutral anti-solenoid for local coupling correction

BNL

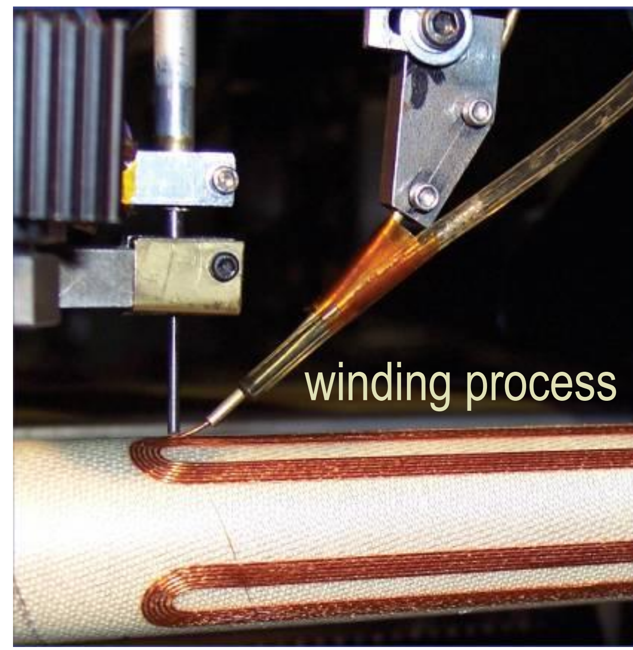
IR Magnets

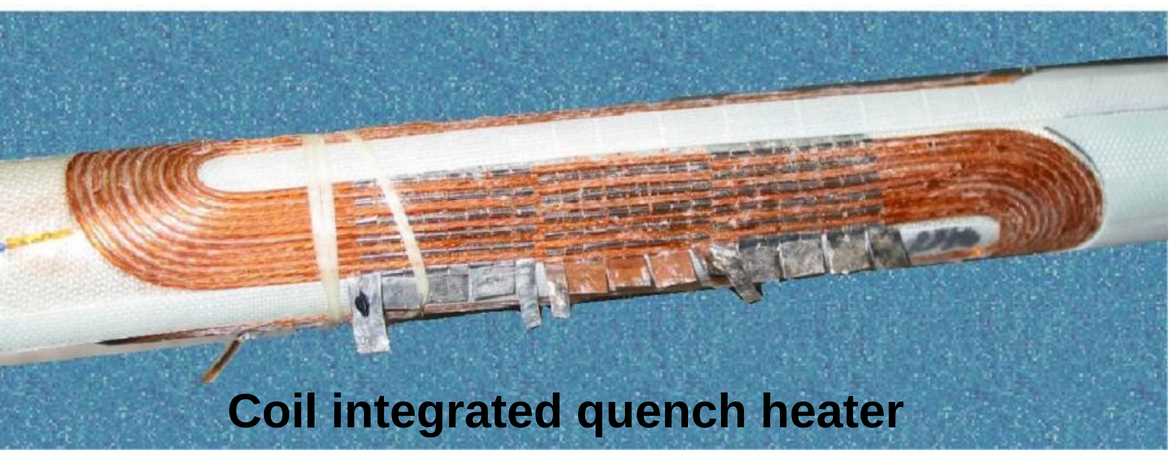




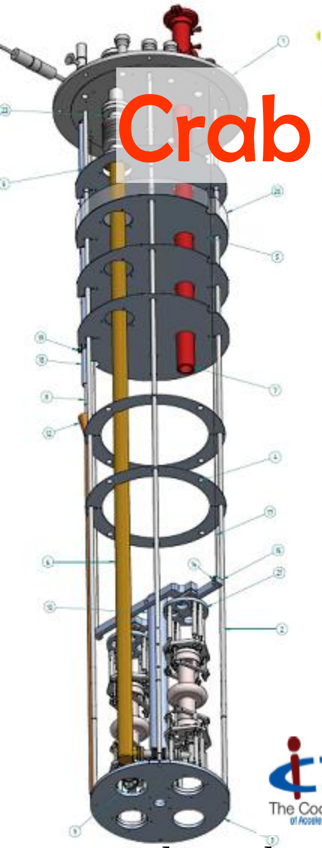
Service cryostat & cryo connections

IR magnets prototypes at BNL

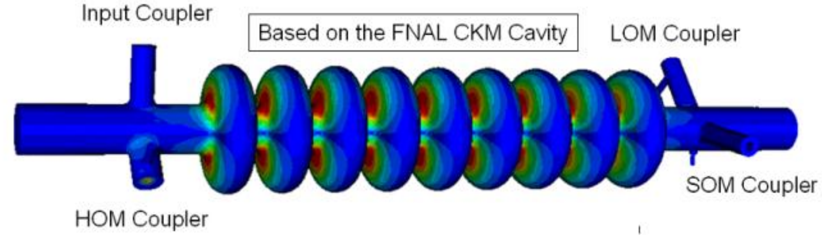


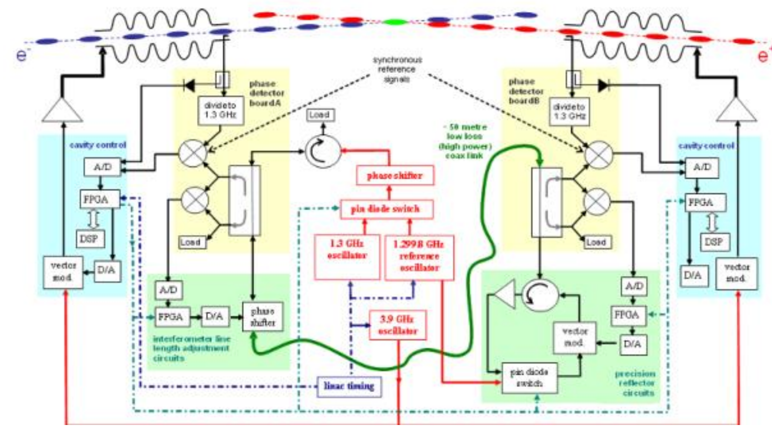


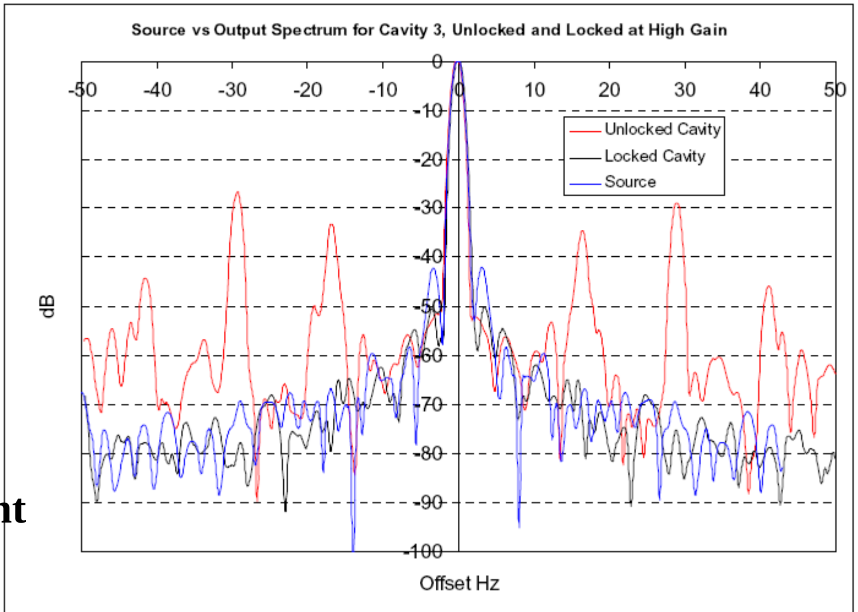
Crab cavity



Cavities limited in gradient to 1 MV/m (~40kV/cell) – shielding implications.







The Cockcroft Institute of Accelerator Science and Technology

ASTeC

SLAC ACD

Independent phase lock achieved for both cavities:

– **Unlocked => 10º r.m.s.**

– **Locked => 0.135º r.m.s.**

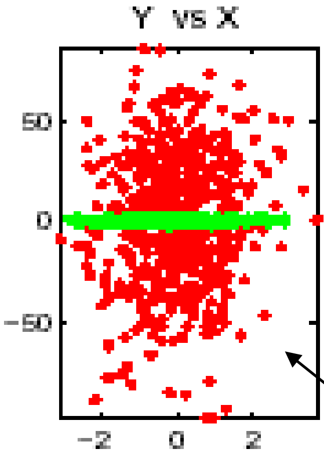
• Performance limited by:

– **Source noise (dominant); ADC noise; Measurement noise; – Cavity frequency drift; Microphonics**

• Improvements being made; new tests being prepared

P.McIntosh at al

IR coupling compensation

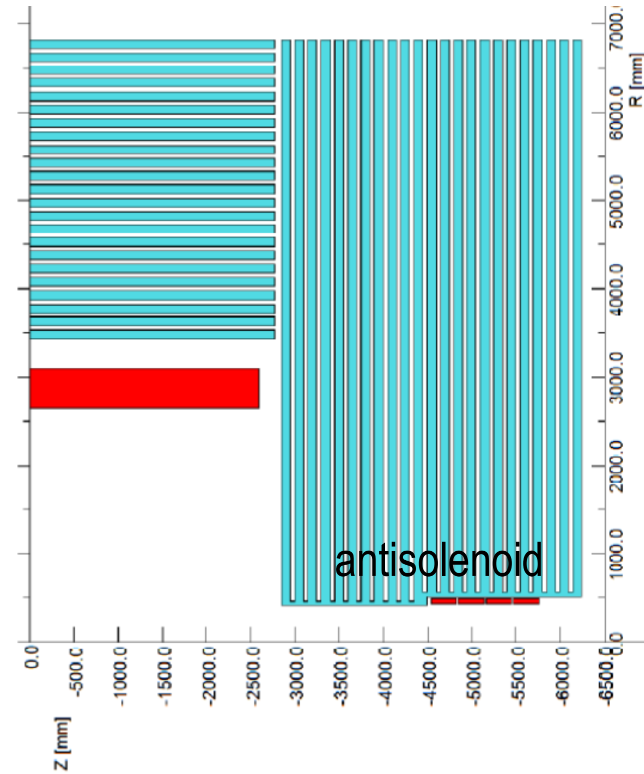


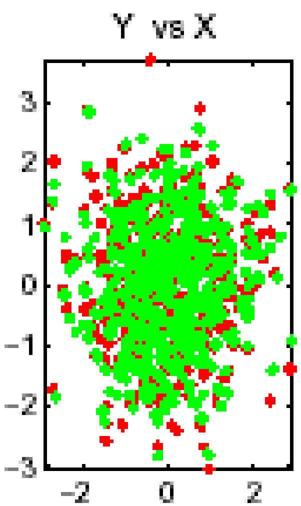
without compensation

$\sigma_y / \sigma_y(0)=32$

When detector solenoid overlaps QD0, coupling between y & x' and y & E causes large (30 – 190 times) increase of IP size (green=detector solenoid OFF, red=ON)

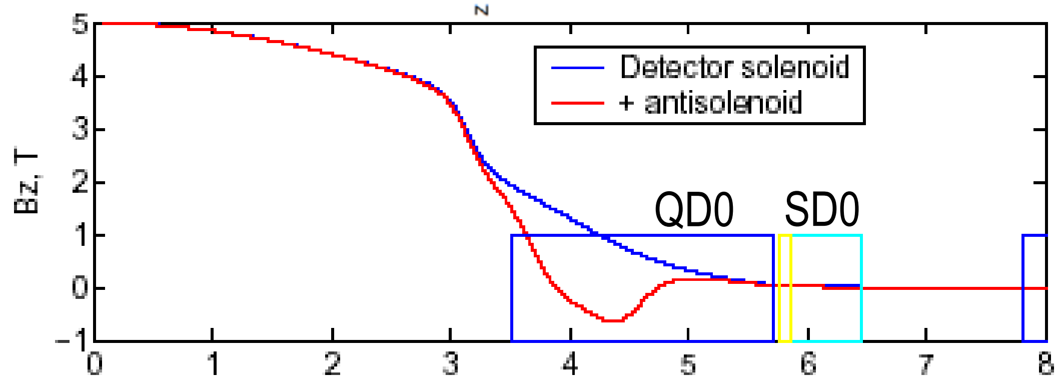
Even though traditional use of skew quads could reduce the effect, the local compensation of the fringe field (with a little skew tuning) is the most efficient way to ensure correction over wide range of beam energies





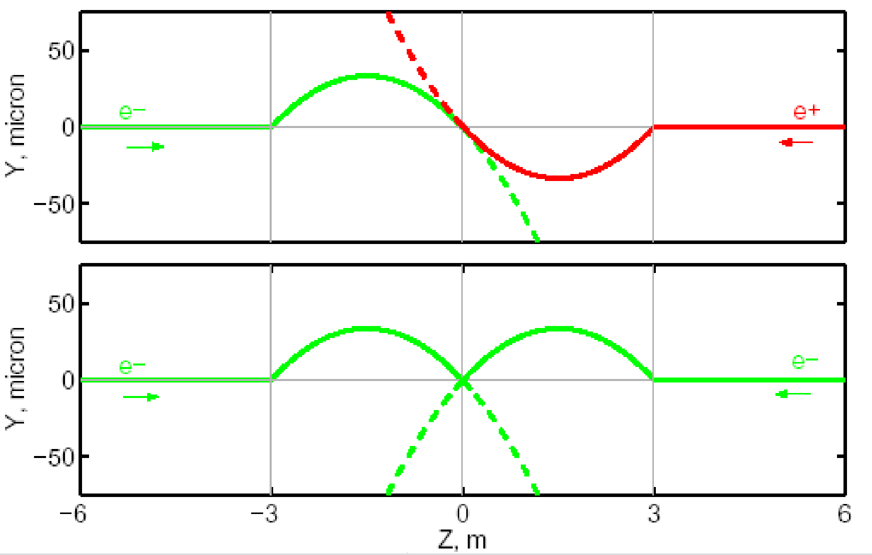
with compensation by antisolenoid

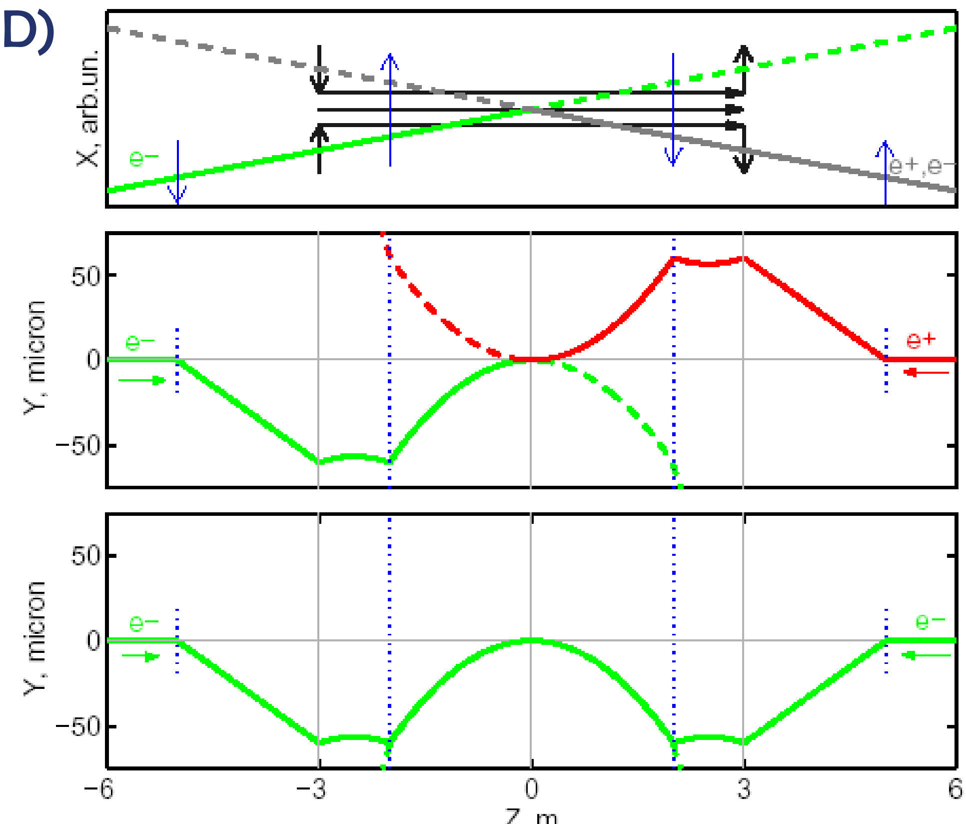
$\sigma_y / \sigma_y(0)<1.01$



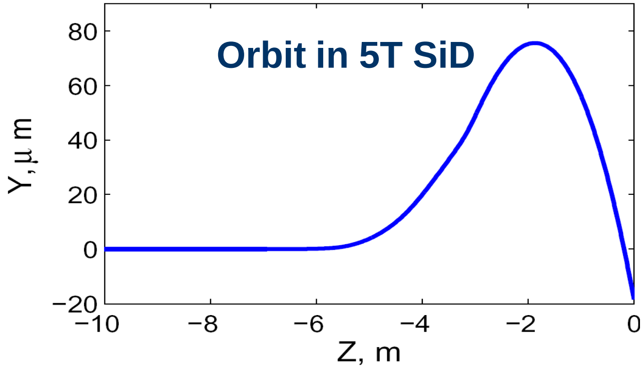
Detector Integrated Dipole

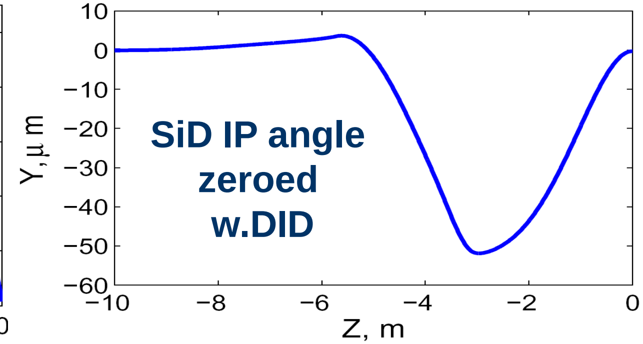
- With a crossing angle, when beams cross solenoid field, vertical orbit arise
- For e+e- the orbit is anti-symmetrical and beams still collide head-on
- If the vertical angle is undesirable (to preserve spin orientation or the e-e- luminosity), it can be compensated locally with DID
- Alternatively, negative polarity of DID may be useful to reduce angular spread of beam-beam pairs (anti-DID)





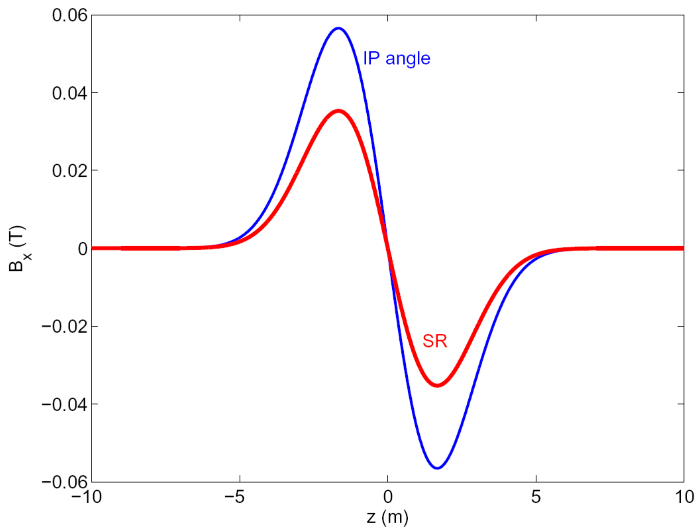
Use of DID or anti-DID

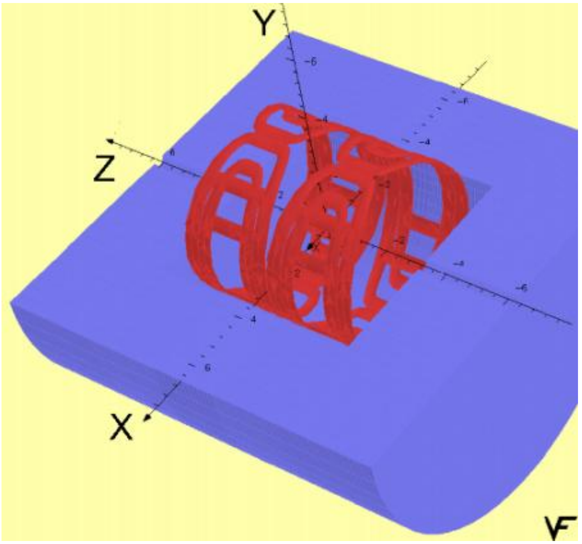




DID case

DID field shape and scheme



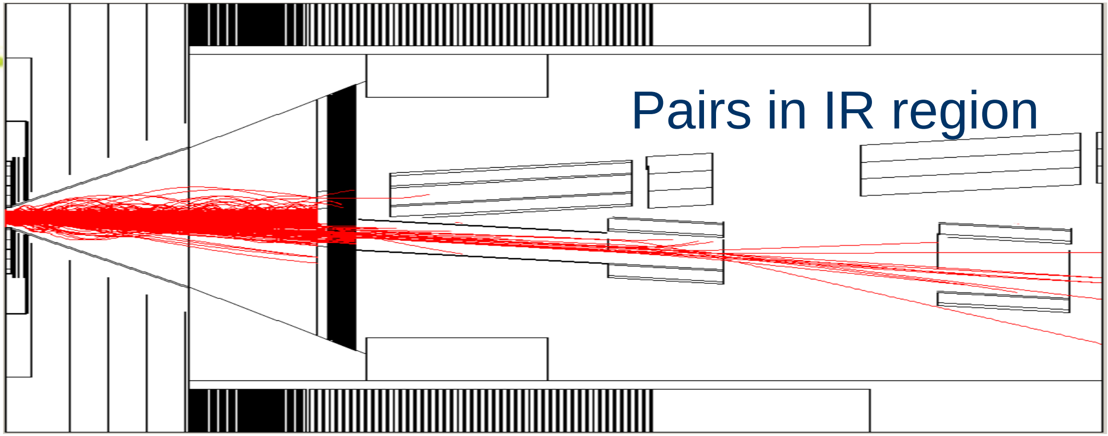


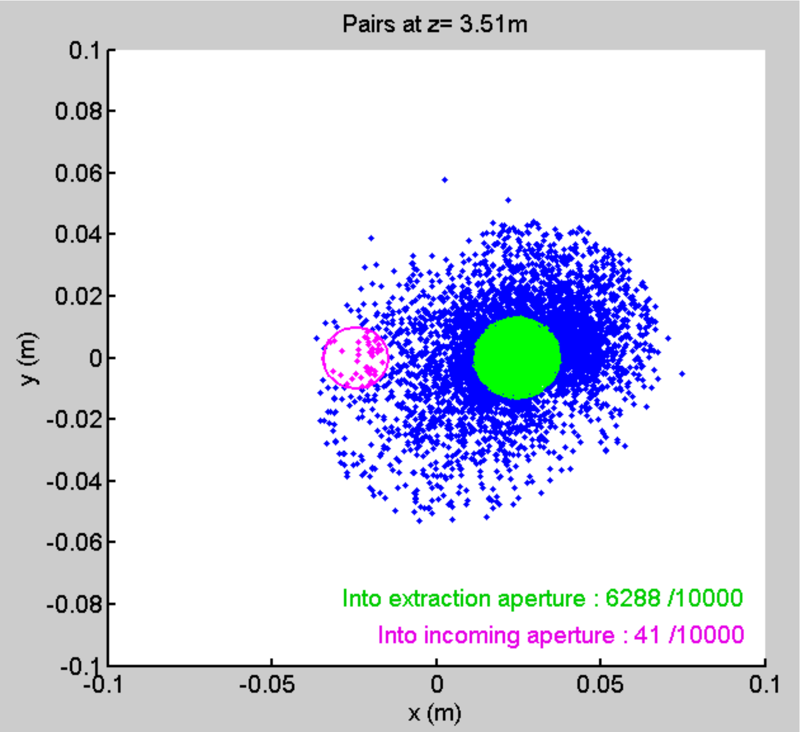
- The negative polarity of DID is also possible (called anti-DID)

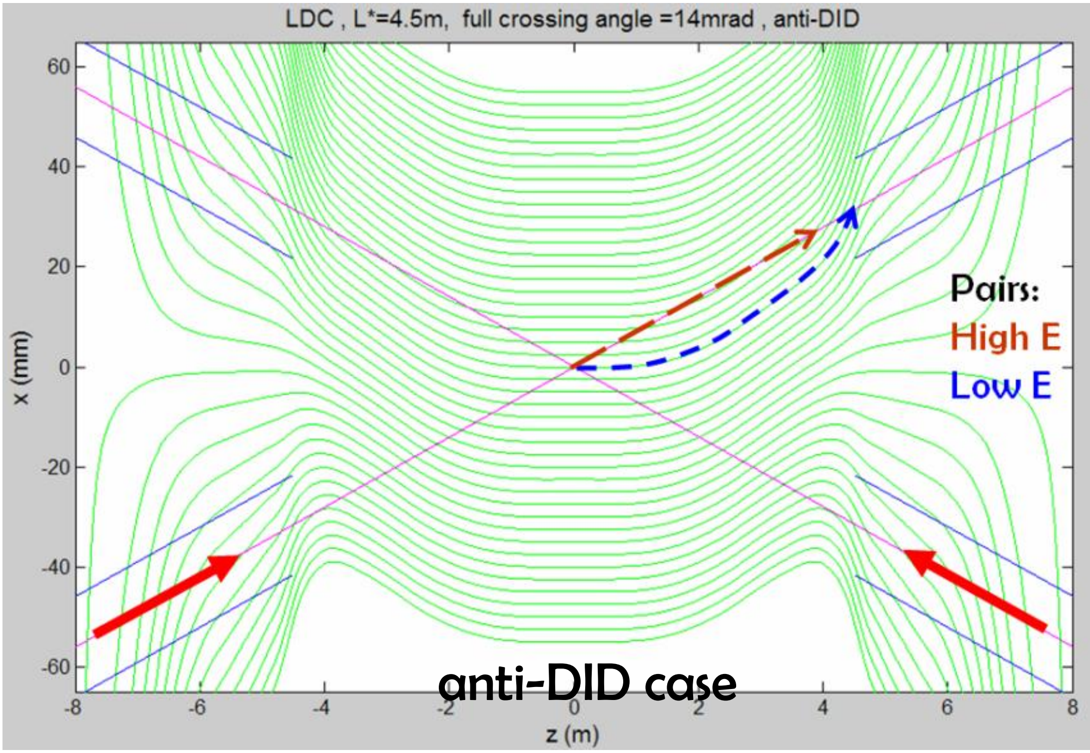
- In this case the vertical angle at the IP is somewhat increased, but the background conditions due to low energy pairs (see below) and are improved

Use of anti-DID to direct pairs

Anti-DID field can be used to direct most of pairs into extraction hole and thus improve somewhat the background conditions

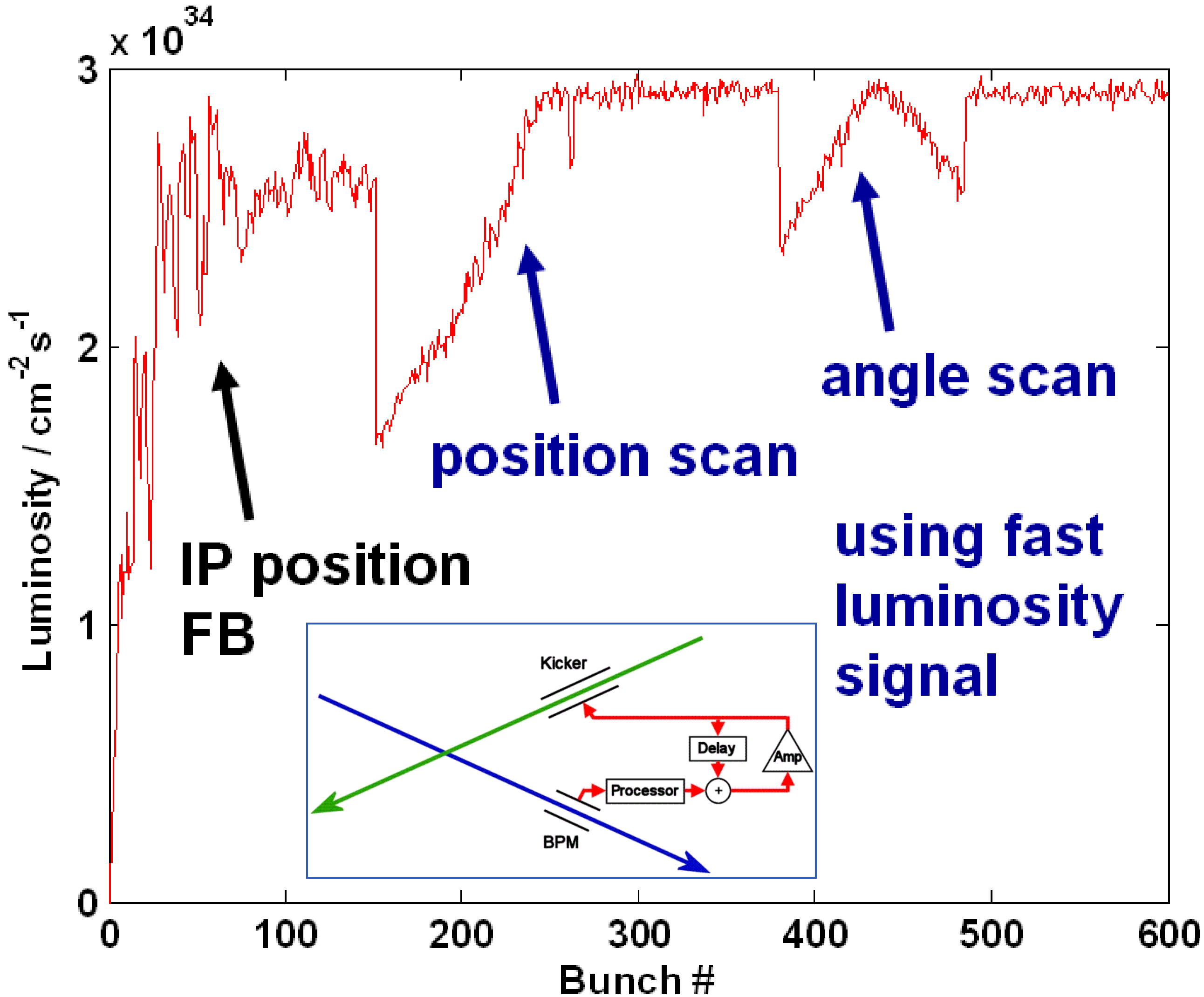






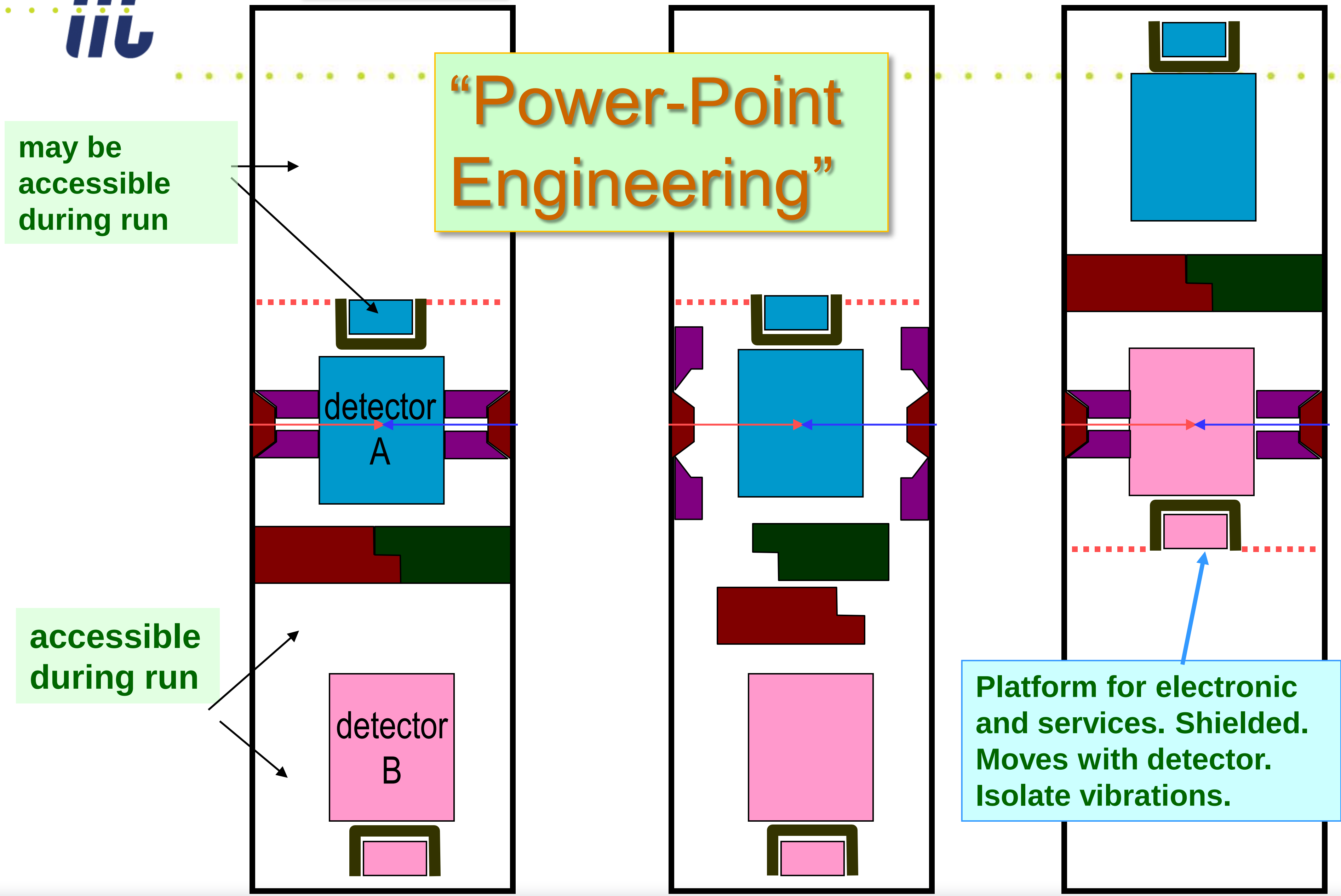
ILC intratrain simulation

ILC intratrain feedback (IP position and angle optimization), simulated with realistic errors in the linac



[Glen White]

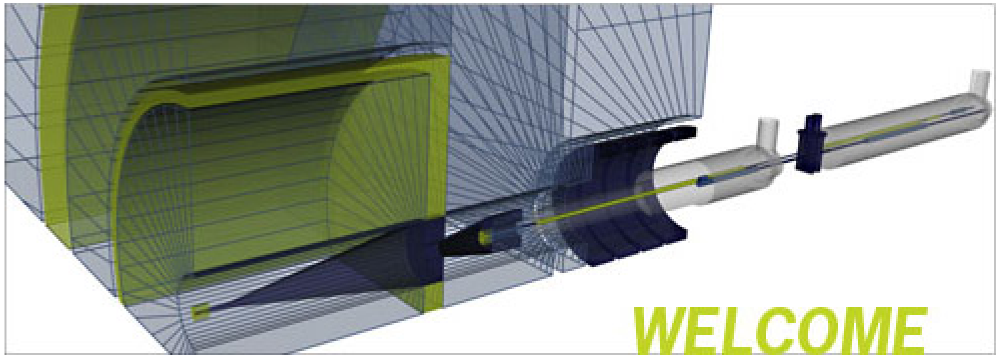
Concept of single IR with two detectors



IRENG07 Workshop

ILC INTERACTION REGION ENGINEERING DESIGN WORKSHOP SLAC

- Home
- Goals
- Registration
- Payment Information
- Agenda
- Organizing Committees
- The Charge to the IPAC
- Accommodations
- Travel and Directions
- Visa Information
- Social Events
- Contact



ILC Interaction Region Engineering Design Workshop

September 17-21, 2007

Stanford Linear Accelerator Center

Menlo Park, California

Please join us to review and advance the design of the subsystem of the Interaction Region of ILC, focusing in particular on their integration, engineering design and arrangements for push-pull operation.

RECENT NEWS

- **Agenda has been updated.**

REGISTRATION

Registration is necessary to participate in the workshop.
Registration fee is $30 and reception fee is $20.

→ Register

ACCOMMODATIONS

A block of 40 rooms is reserved until July 15, 2007 at the **Stanford Guest House**. Please reserve your room early and mention that you are attending this workshop.

→ More Information

http://www-conf.slac.stanford.edu/ireng07/

Work in preparation for IRENG07

- **WG-A: Overall detector design, assembly, detector moving, shielding.**
  - Including detector design for on-surface assembly and underground assembly procedures. Beamline pacman & detector shielding…
    - Conveners: Alain Herve (CERN), Tom Markiewicz (SLAC), Tomoyuki Sanuki (Tohoku Univ.), Yasuhiro Sugimoto (KEK)
- **WG-B: IR magnets design and cryogenics system design.**
  - Including cryo system, IR magnet engineering design, support, integration with IR, masks, Lumi & Beamcals, IR vacuum chamber...
    - Conveners: Brett Parker (BNL), John Weisend (SLAC/NSF), Kiyosumi Tsuchiya (KEK)
- **WG-C: Conventional construction of IR hall and external systems.**
  - Including lifting equipment, electronics hut, cabling plant, services, shafts, caverns, movable shielding; solutions to meet alignment tolerances...
    - Conveners: Vic Kuchler (FNAL), Atsushi Enomoto (KEK), John Osborne (CERN)
- **WG-D: Accelerator and particle physics requirements.**
  - Including collimation, shielding, RF, background, vibration and stability and other accelerator & detector physics requirements…
    - Conveners: Deepa Angal-Kalinin (STFC), Nikolai Mokhov (FNAL), Mike Sullivan (SLAC), Hitoshi Yamamoto (Tohoku Univ.)

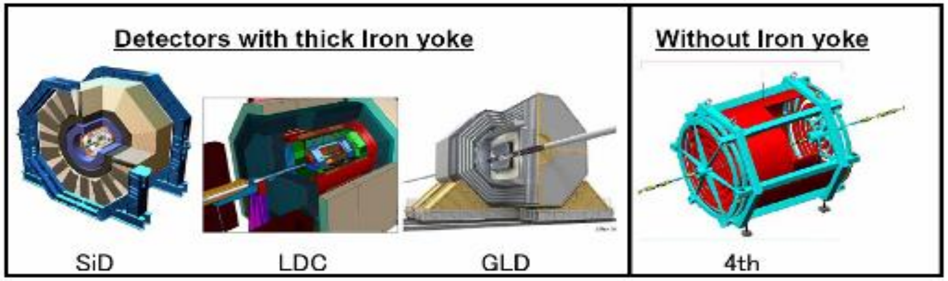
- WG-A, conveners meeting, July 5
- WG-D, conveners meeting, July 11
- WG-A, group meeting, July 12
- WG-B, conveners meeting, July 13
- WG-C, group meeting, July 17
- WG-B, group meeting, July 23
- WG-C, group meeting, July 24
- WG-A, group meeting, July 30
- WG-C, group meeting, July 31
- WG-D, group meeting, August 1
- WG-B, group meeting, August 2
- WG-A, group meeting, August 6
- WG-C, group meeting, August 7
- WG-A, group meeting, August 13
- WG-D, group meeting, August 15
- WG-B, group meeting, August 16
- WG-A, group meeting, August 20
- WG-C, group meeting, August 21
- WG-A, group meeting, August 27
- WG-C, group meeting, August 28
- Conveners and IPAC mtg, August 29
- WG-B, group meeting, August 30
- WG-B, group meeting, September 13

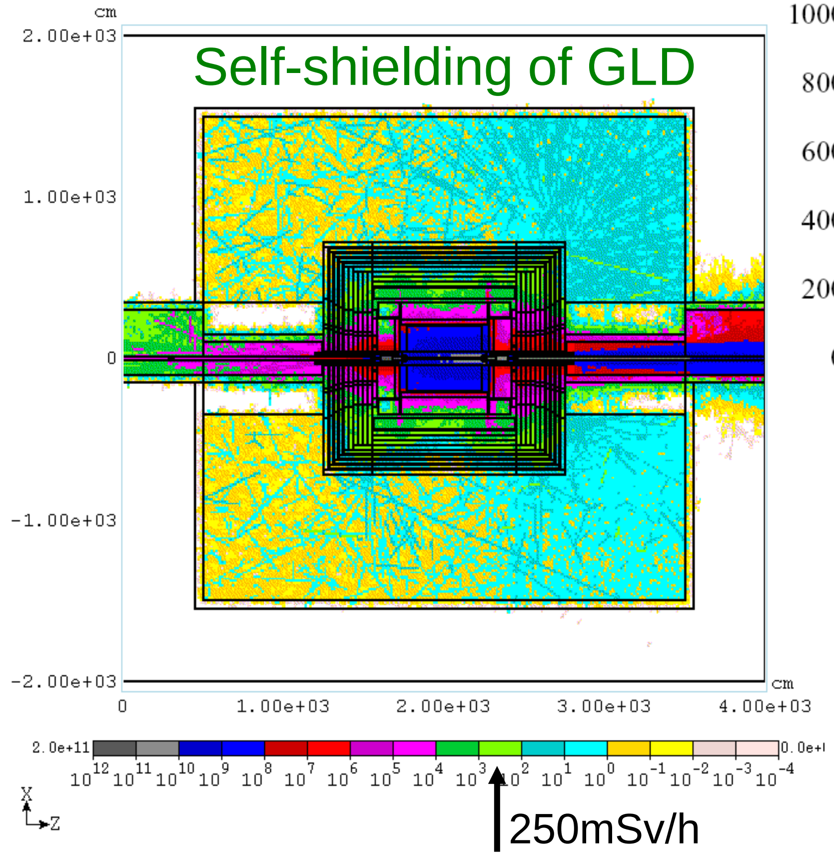
http://www-conf.slac.stanford.edu/ireng07/agenda.htm

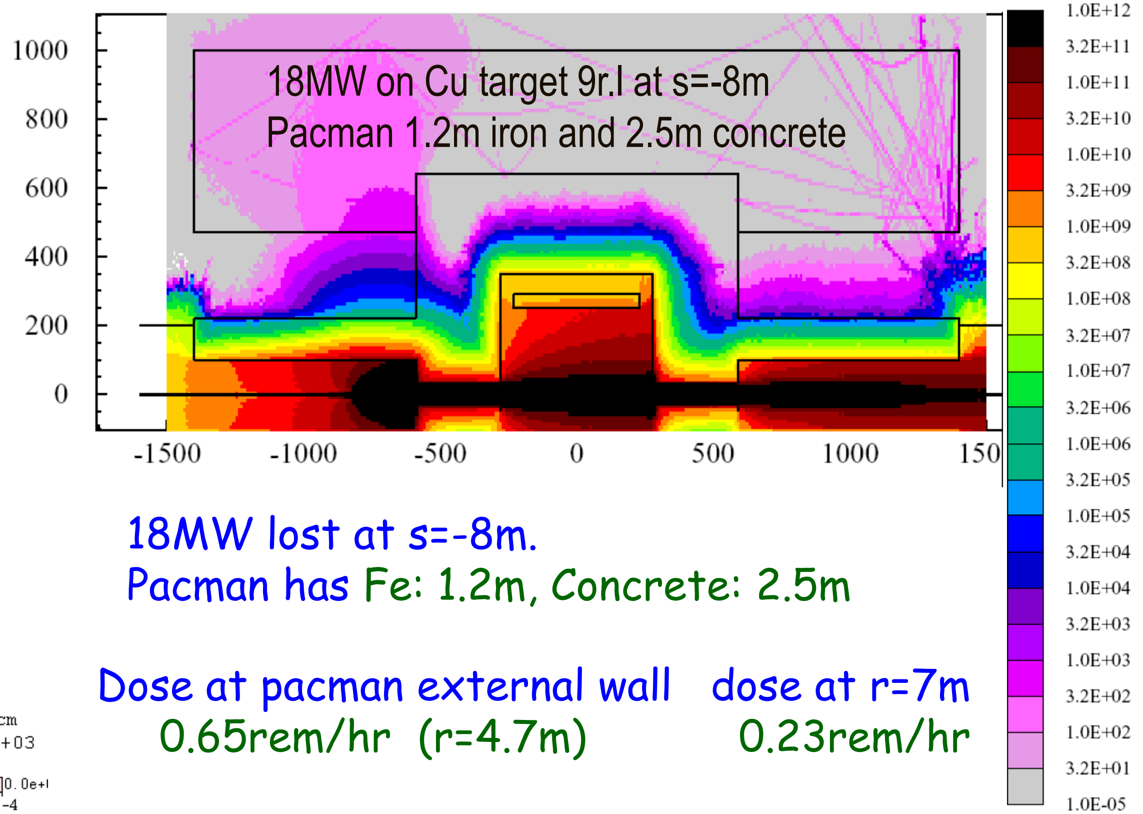
Example of MDI issues: Shielding the IR hall

Detector itself is well shielded except for incoming beamlines.

A proper "pacman" can shield the incoming beamlines and remove the need for shielding wall.







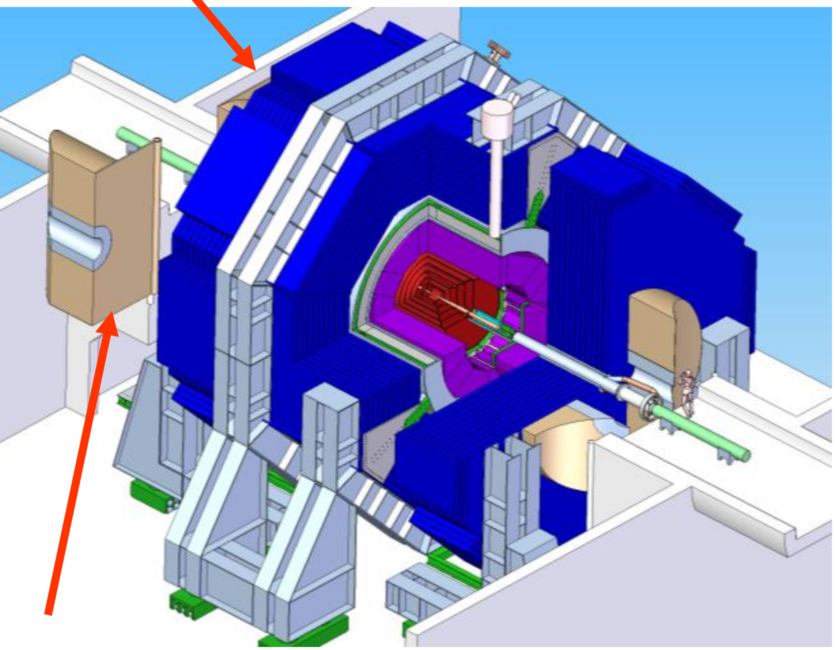
18MW lost at s=-8m.
Pacman has Fe: 1.2m, Concrete: 2.5m

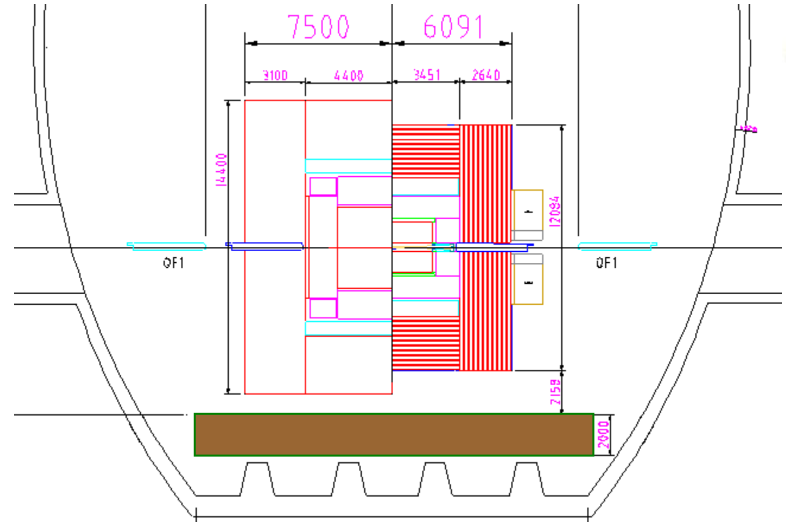
Dose at pacman external wall 0.65rem/hr (r=4.7m)

dose at r=7m 0.23rem/hr

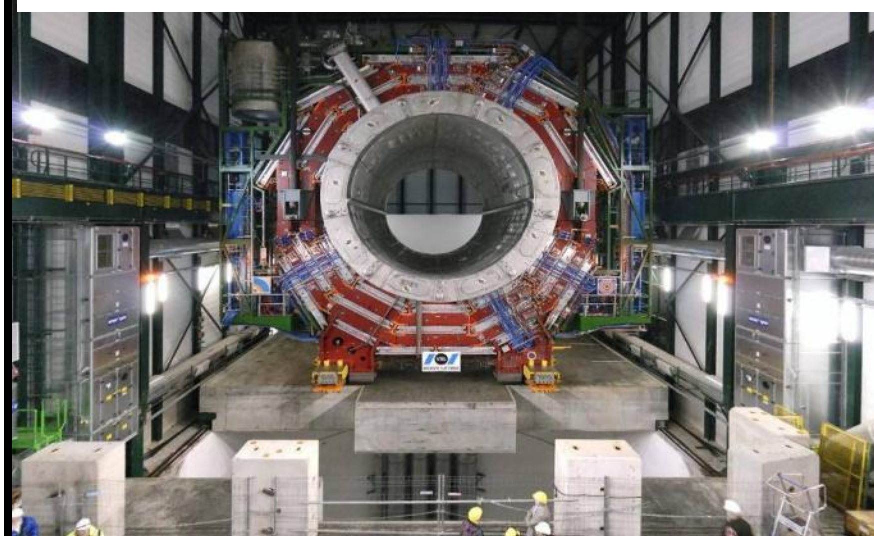
Example of MDI issues: moving detectors

Detector motion system with
or without an intermediate platform



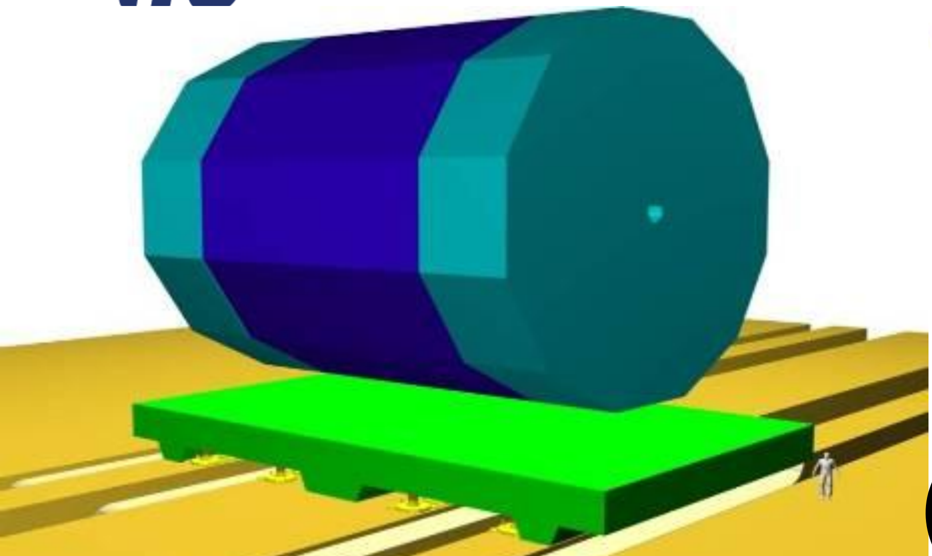


Detector and beamline shielding elements

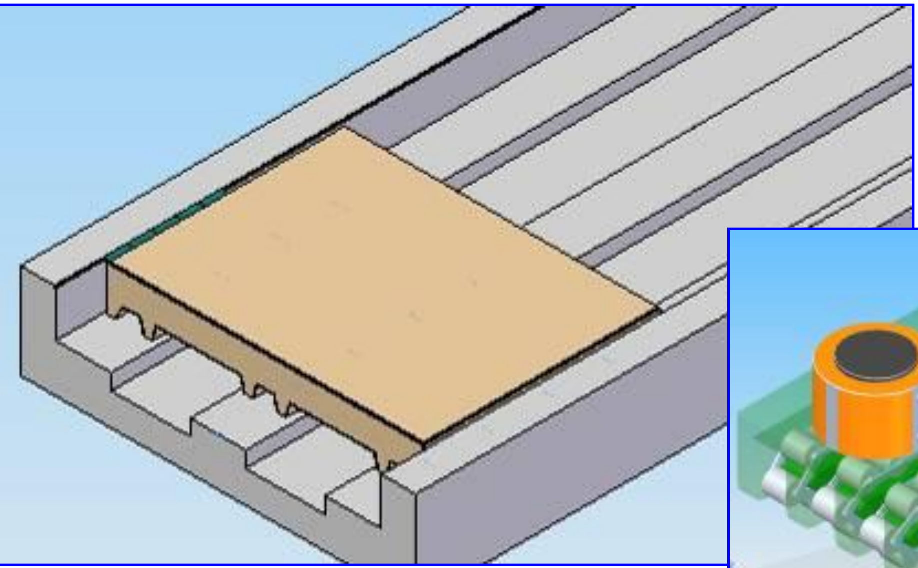


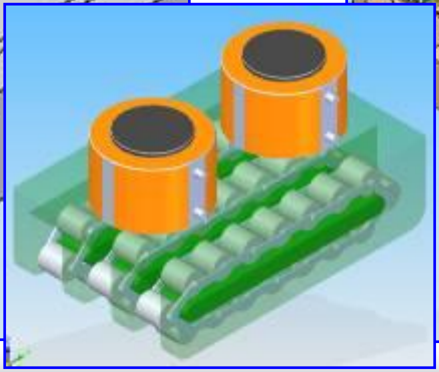
CMS platform – proof of principle for ILC

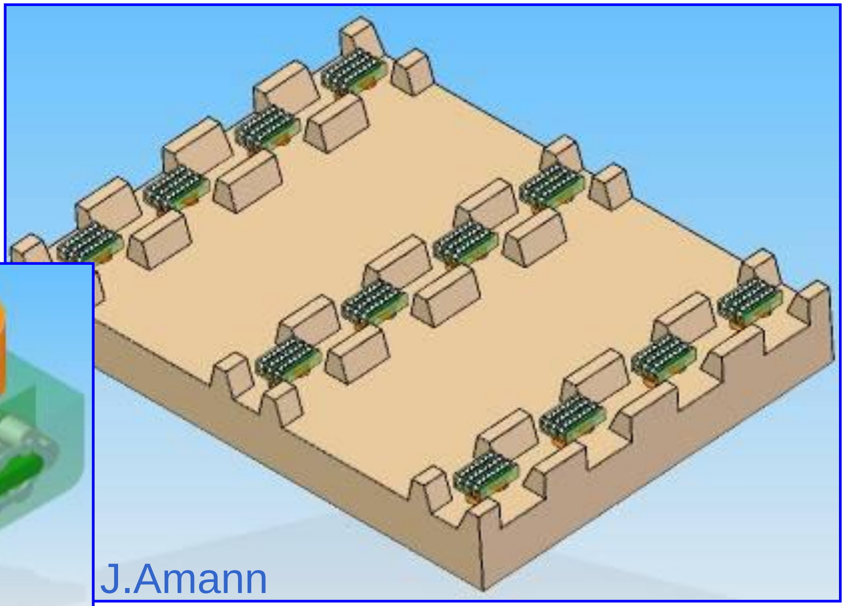
Moving the detector



Concept of the platform, A.Herve, H.Gerwig

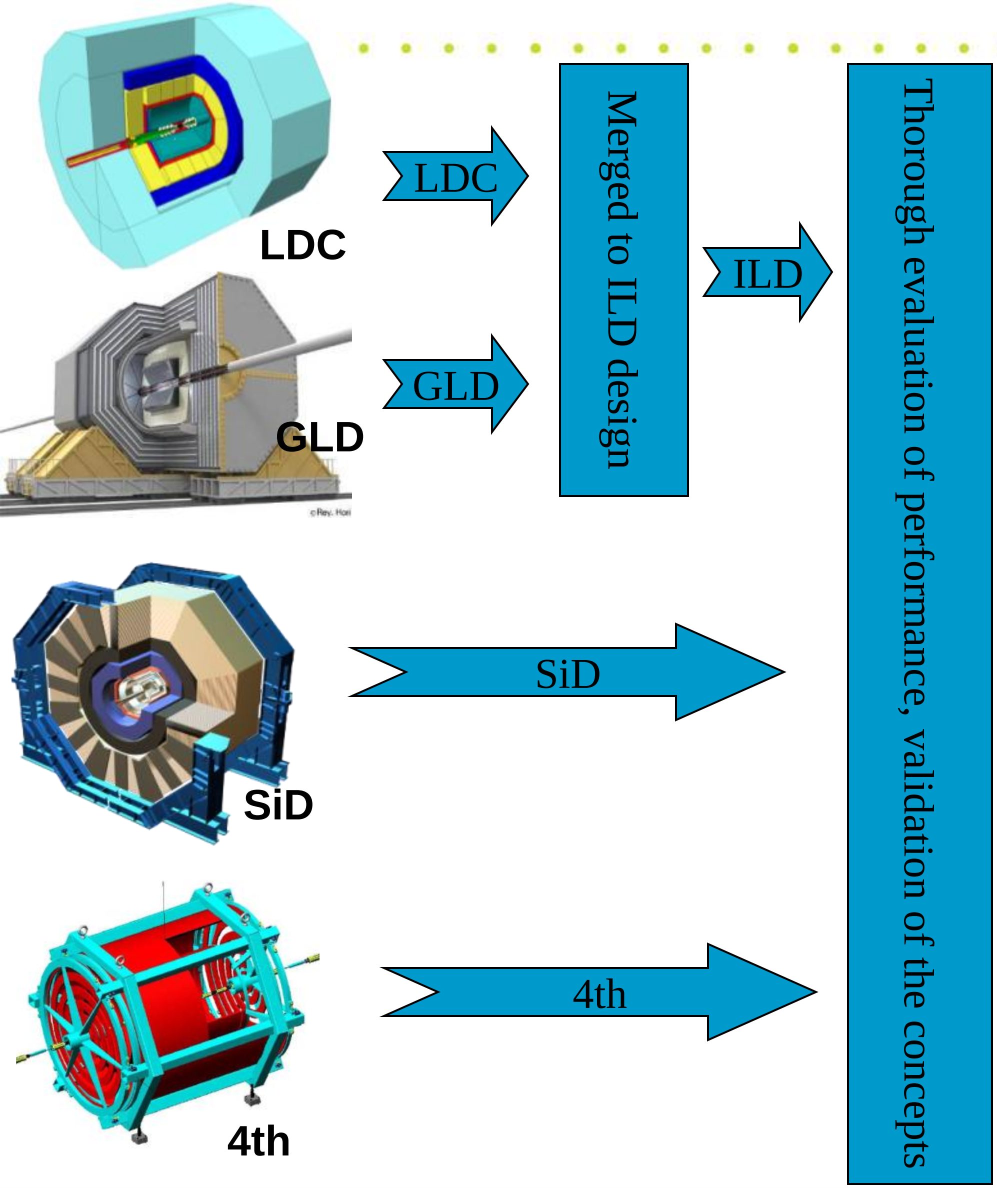


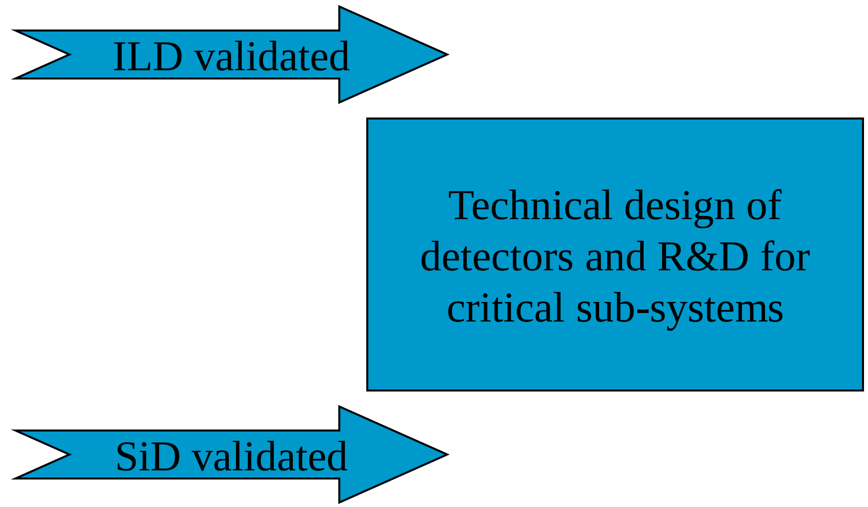




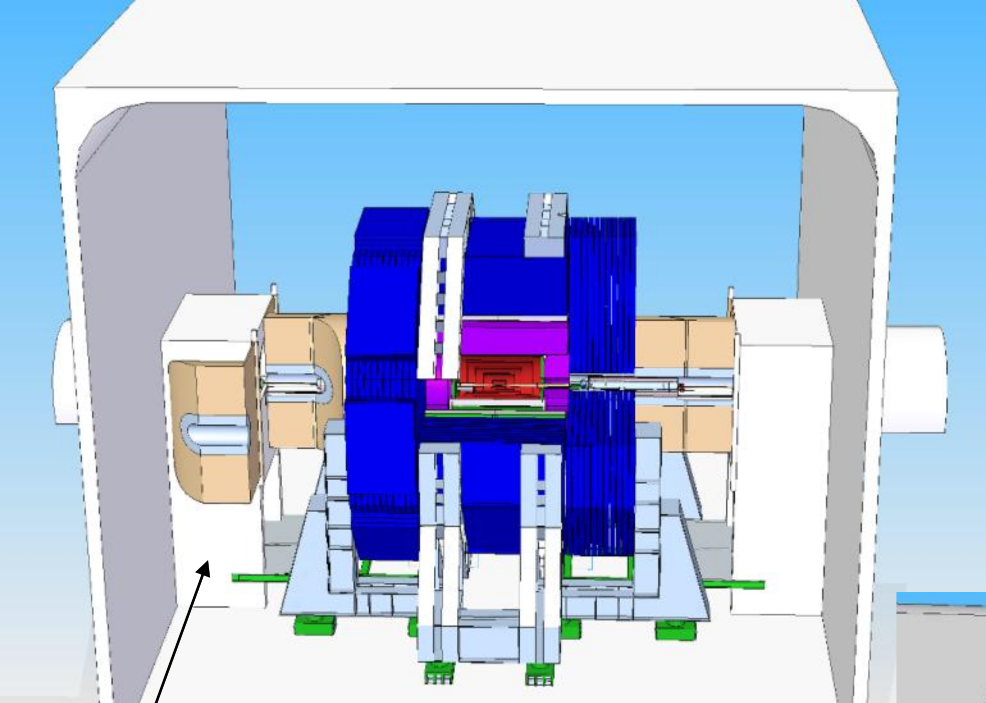
J.Amann

Evolution of ILC Detectors



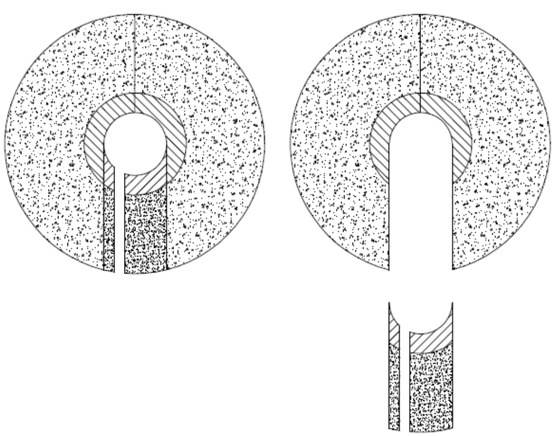


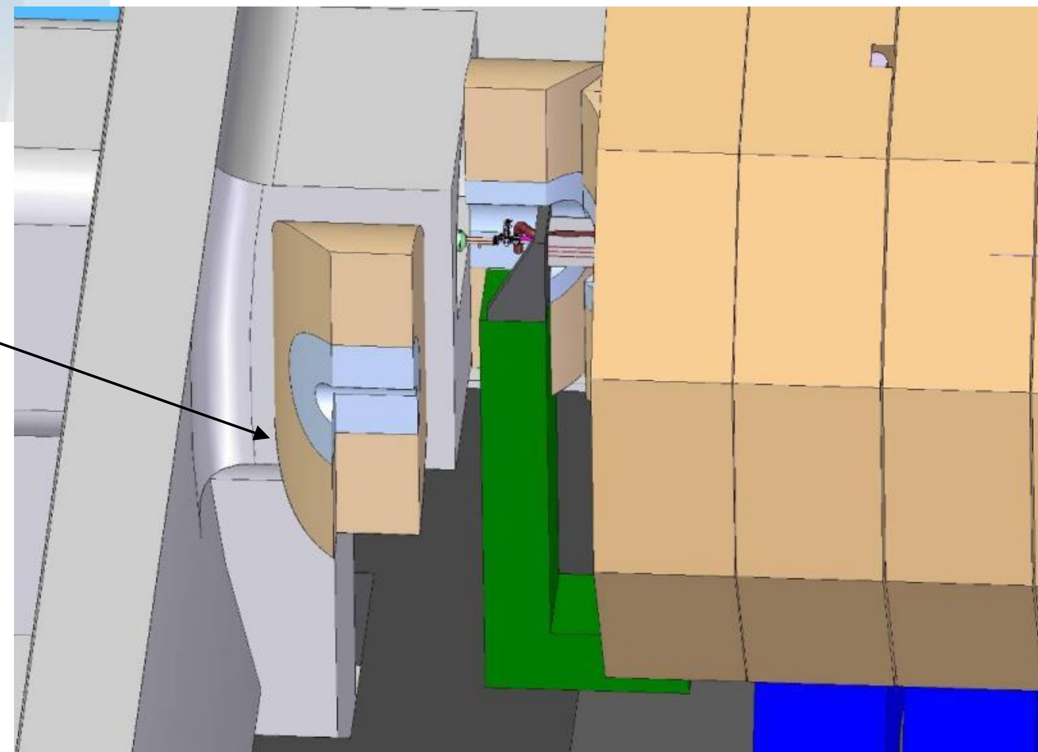
- **Evolution, self-review and selection process are essential for meeting the challenging detector requirements motivated by physics**
  - Triggerless event collection (software event selection)
  - Extremely precise vertexing
  - Vertex, tracker, calorimeters integrated for optimal jet reconstruction



Example of system where initially different designs converged on a single compatible solution:
CMS-Inspired Hinged PacMan
w/ Cut-outs for ILD Pillar and Plugs

SiD ILD

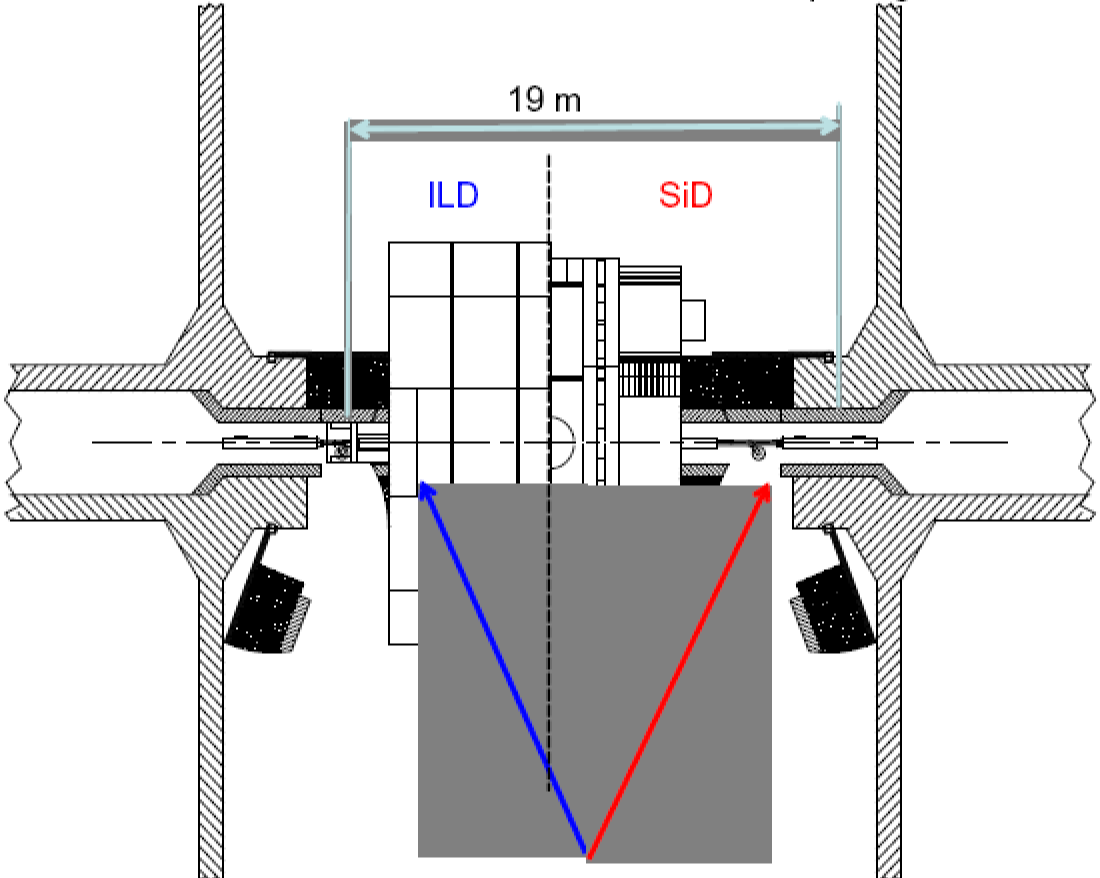




M.Oriunno, H.Yamaoka, A.Herve, et. al

Pacman compatible with SiD

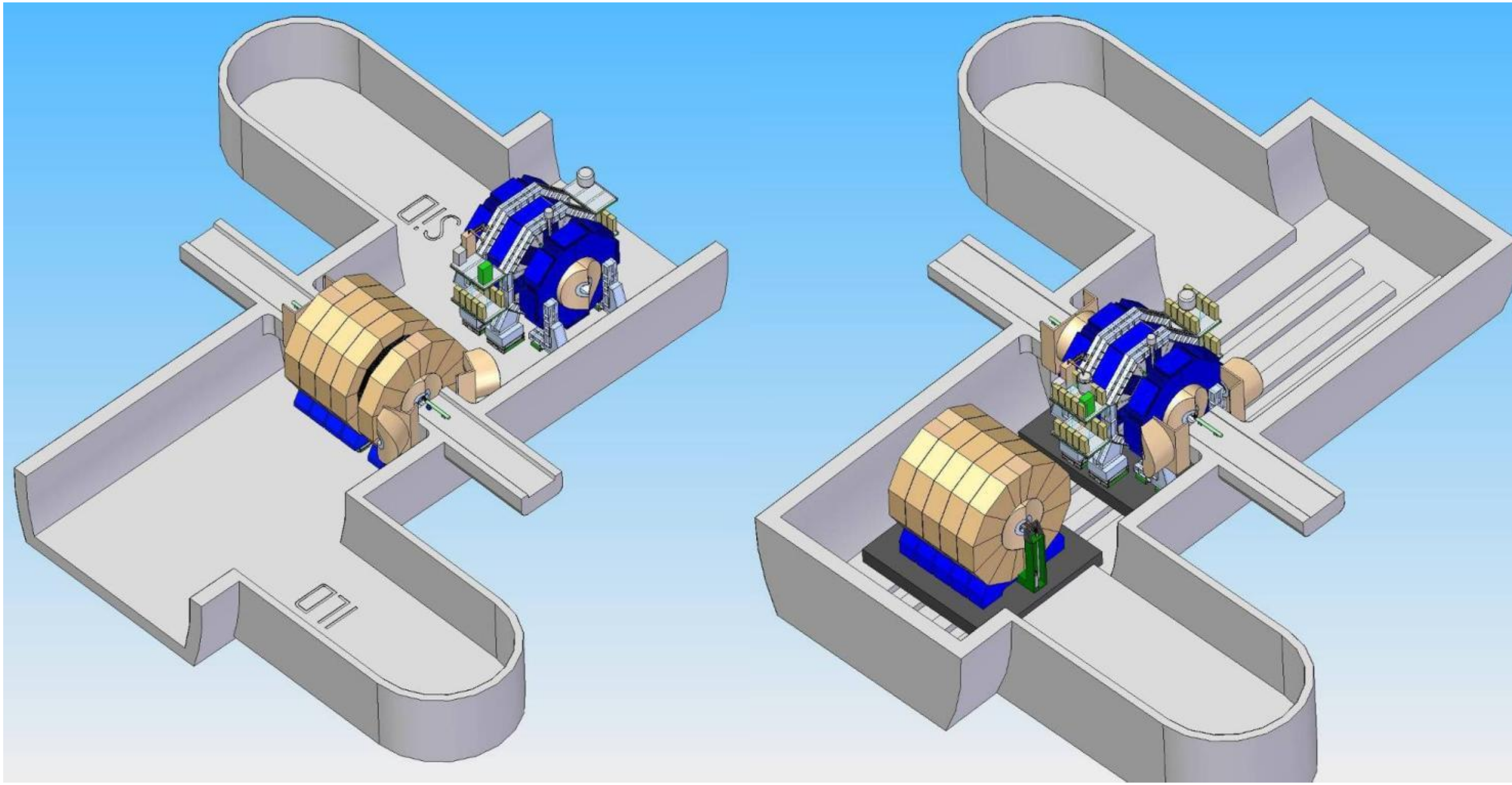
Pacmen closed: Modified to allow ILD opening



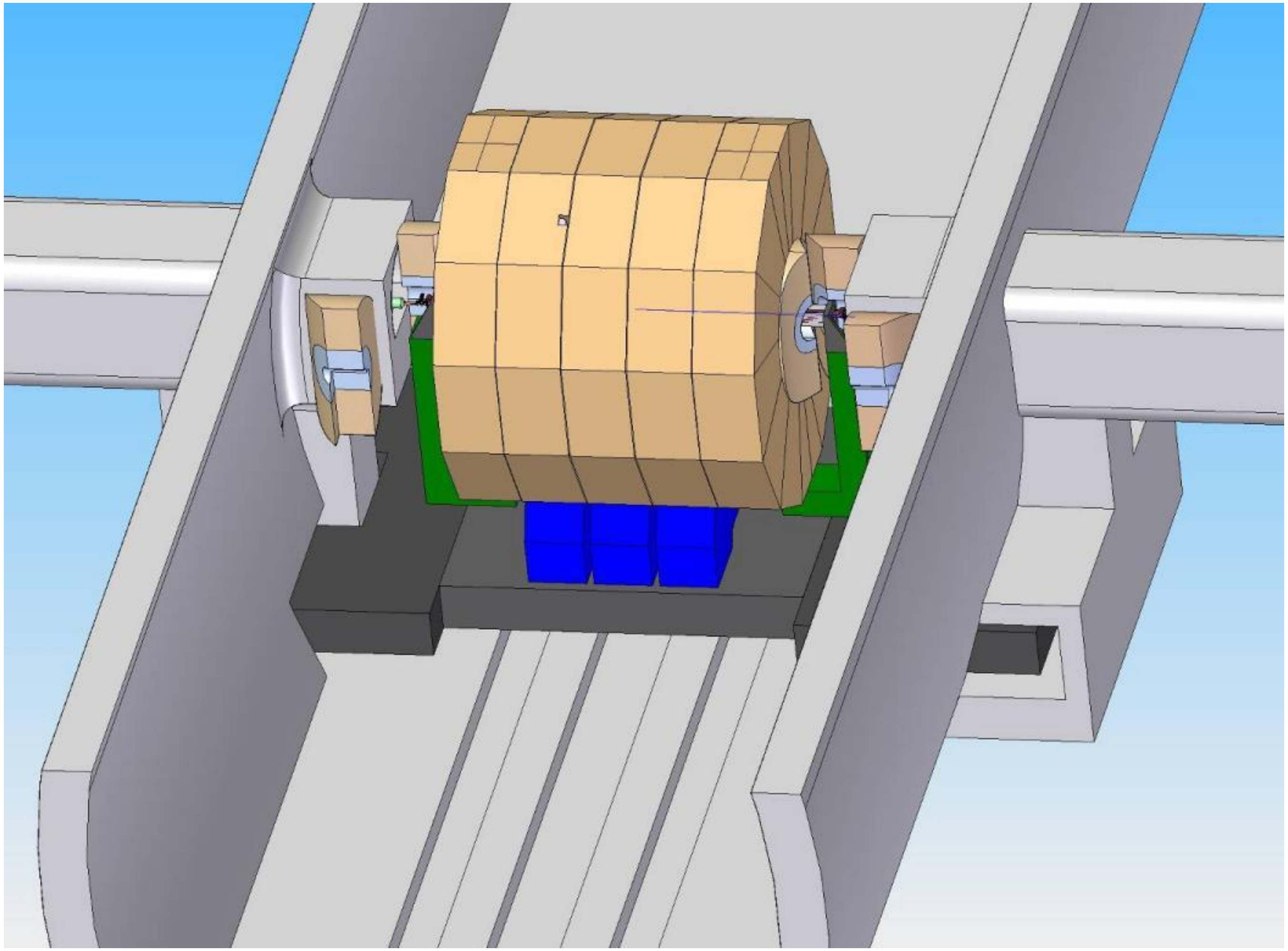
Interface pieces born by each experiment

From A. Hervé, K. Sinram, M. Oriunno

All detectors without / with platform

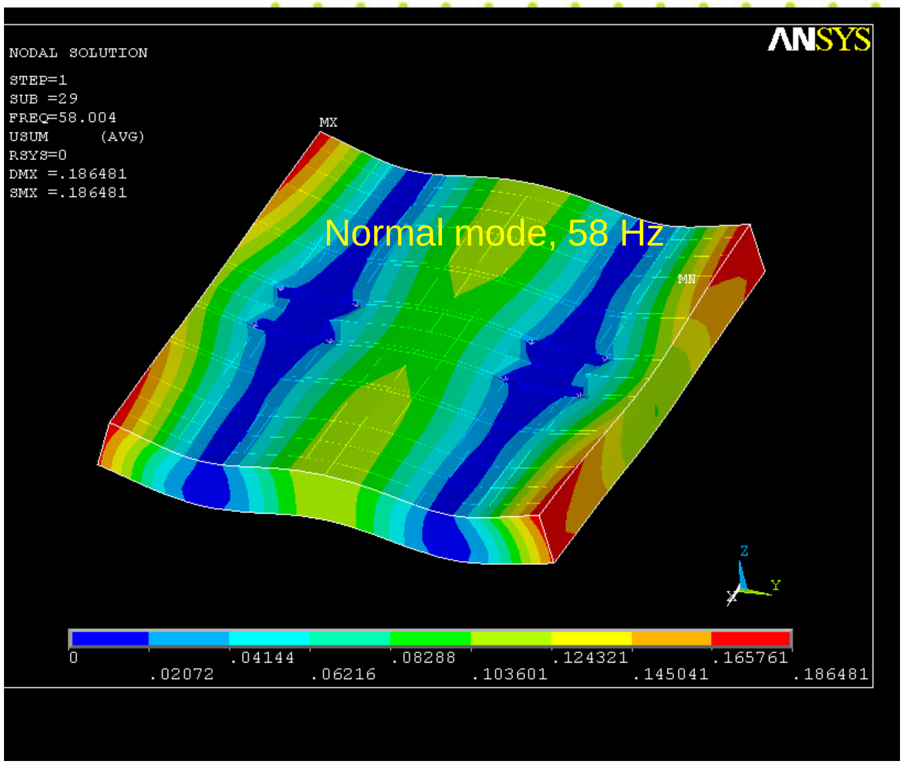


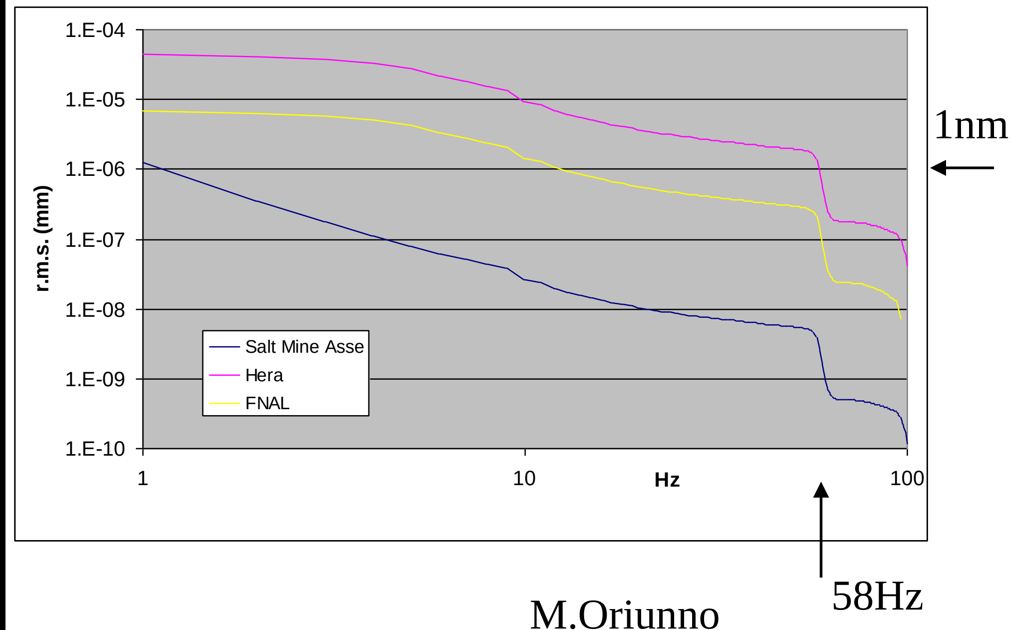
Half Platform w/ Pocket Storage



A.Herve, M.Oriunno, K,Sinram, T.Markiewicz, et al

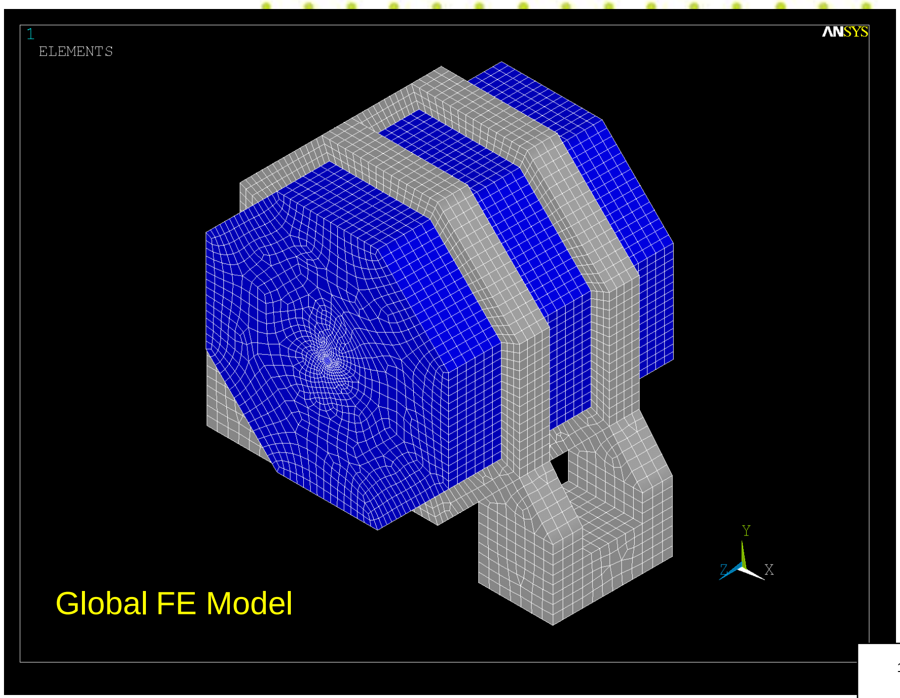
Preliminary
ANSYS analysis of Platform

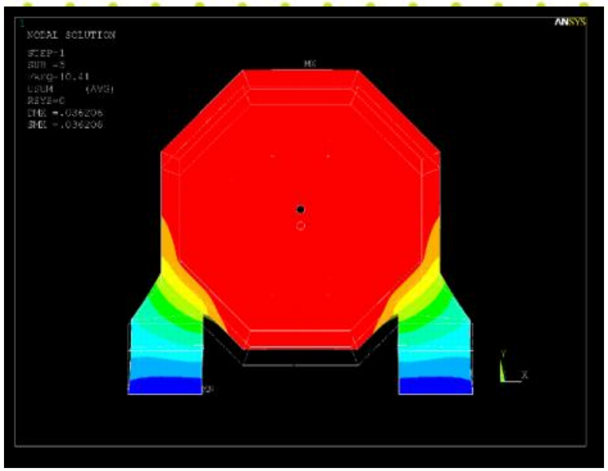




- First look of platform stability look rather promising: resonance frequencies are rather large (e.g. 58Hz) and additional vibration is only several nm

Detector stability analysis (SiD)

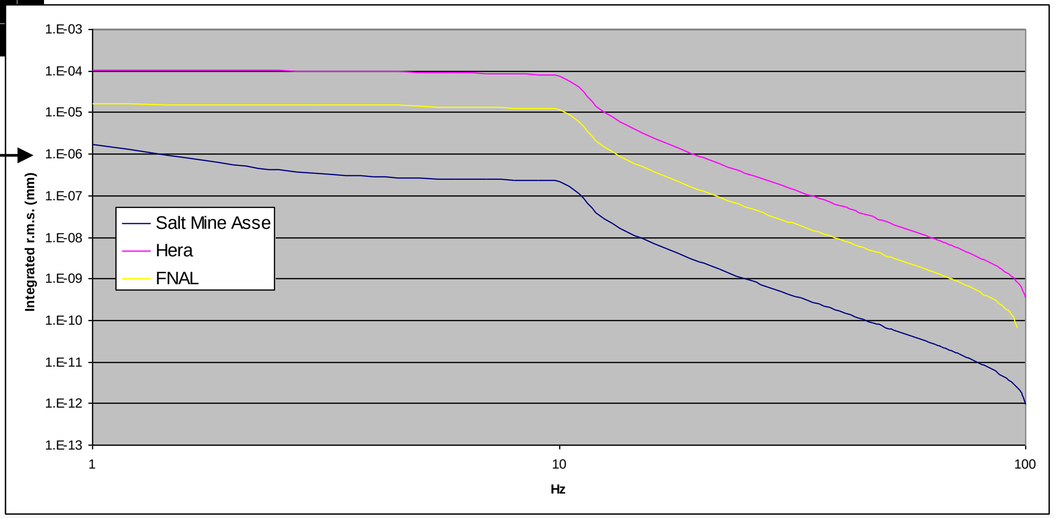




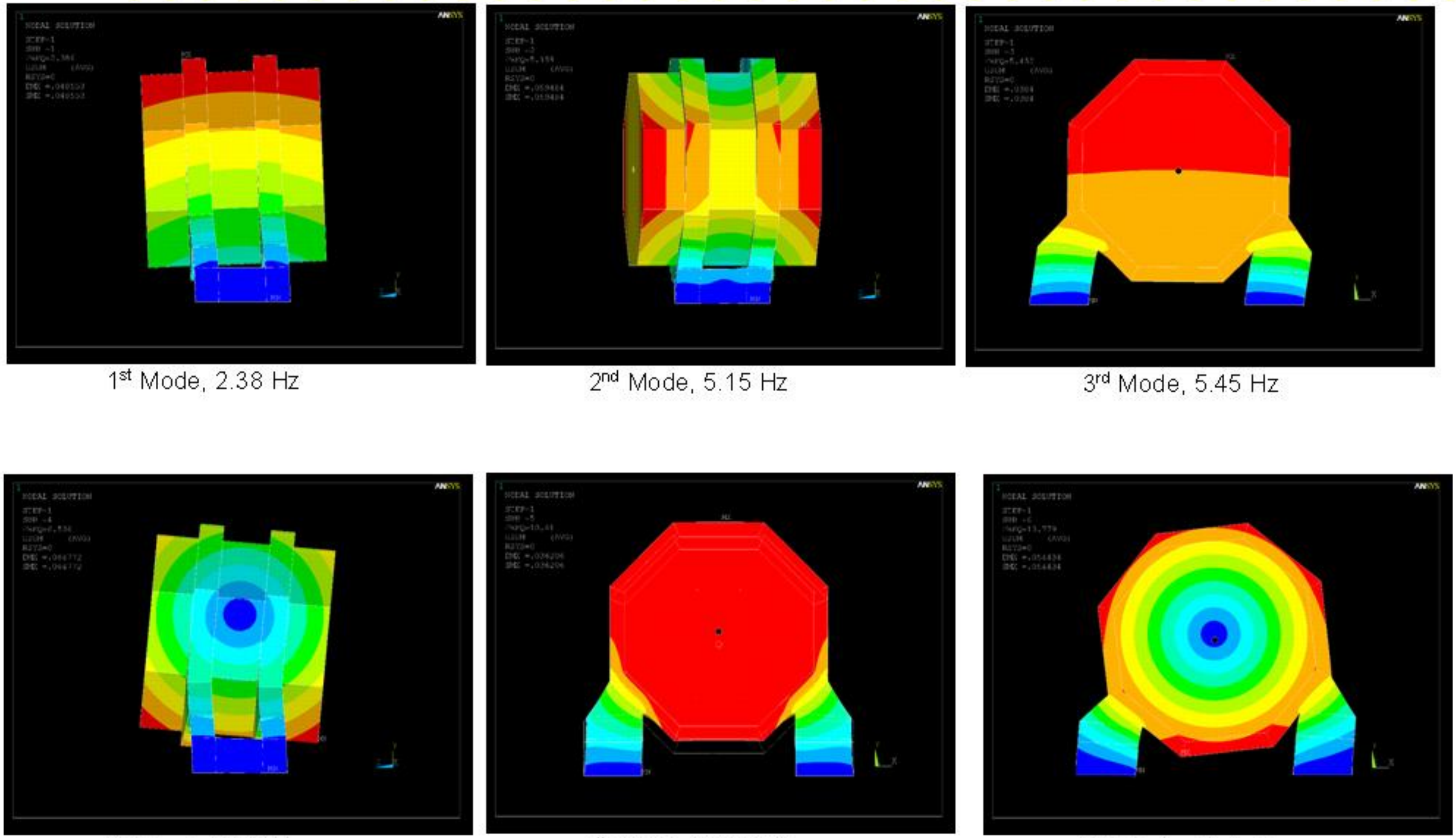
First vertical motion mode, 10.42 Hz

- First analysis shows possibilities for optimization
  - e.g. tolerance to fringe field => detector mass => resonance frequency

1nm



Free vibration modes of SiD



1st Mode, 2.38 Hz

2nd Mode, 5.15 Hz

3rd Mode, 5.45 Hz

4th Mode, 6.53 Hz

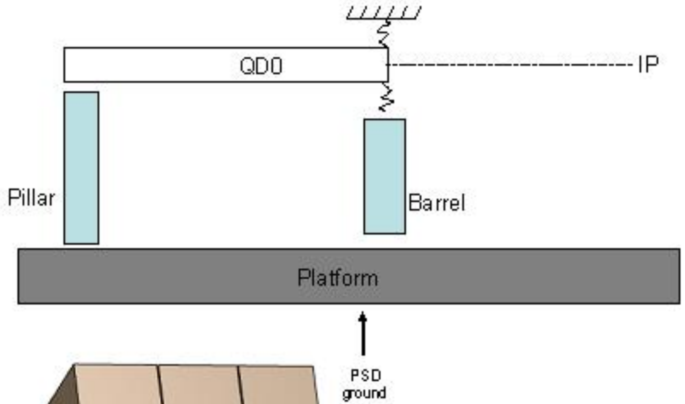
5th Mode, 10.42 Hz

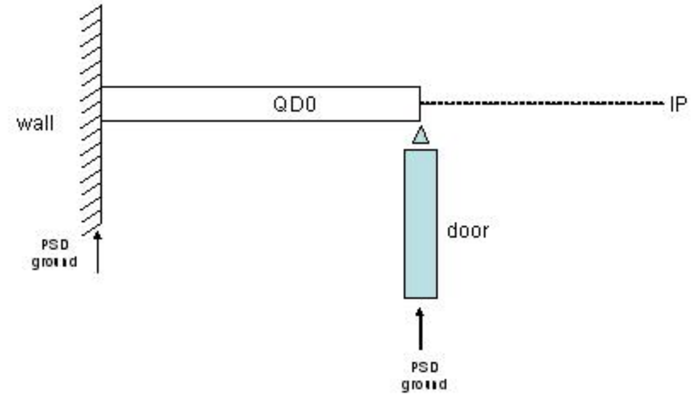
6th Mode, 13.7 Hz

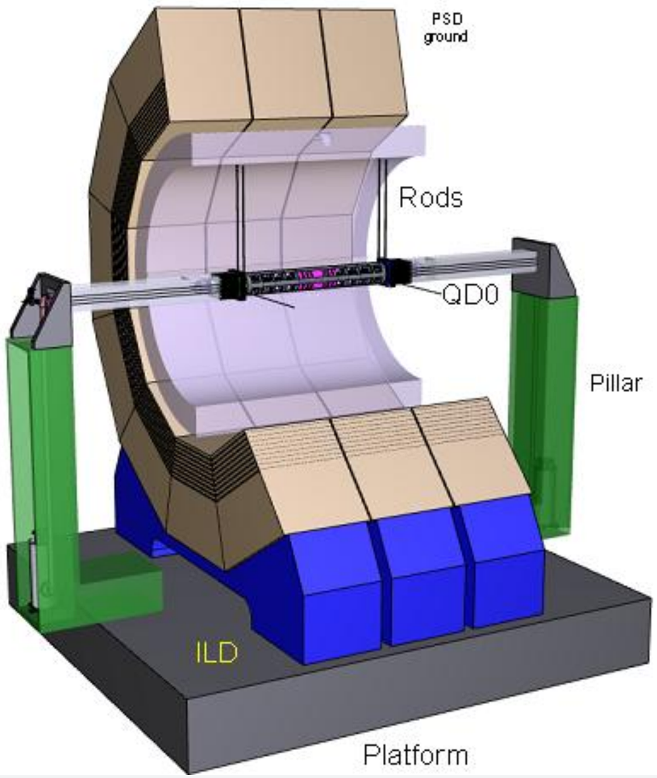
Vertical motion

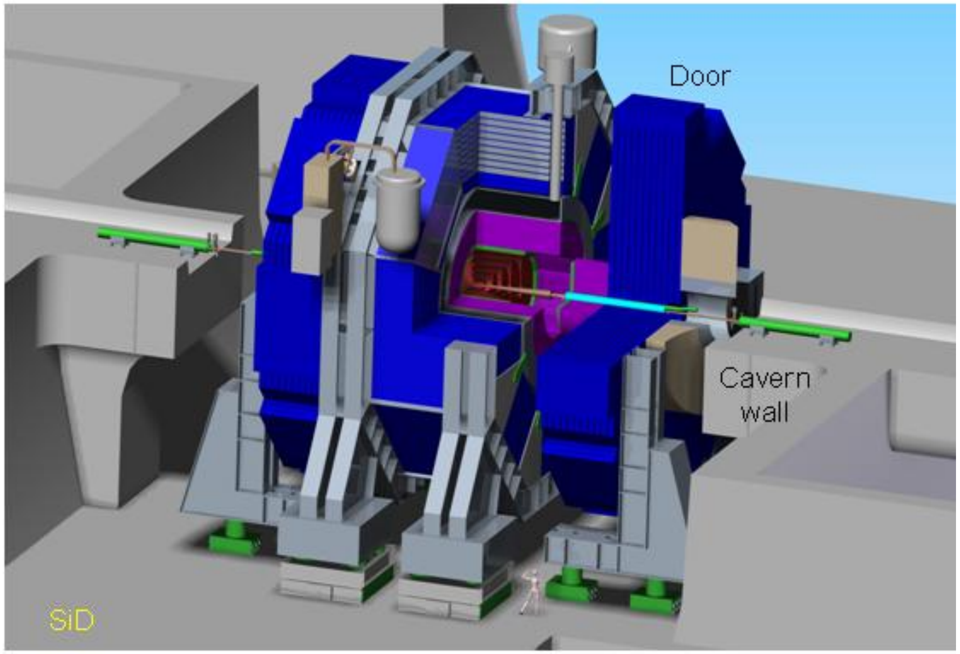
M.Oriunno

QD0 supports in ILD and SiD

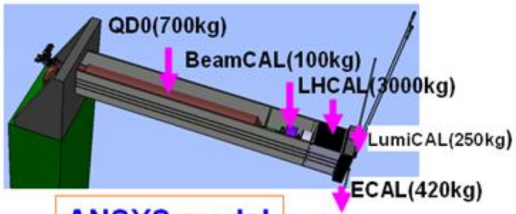




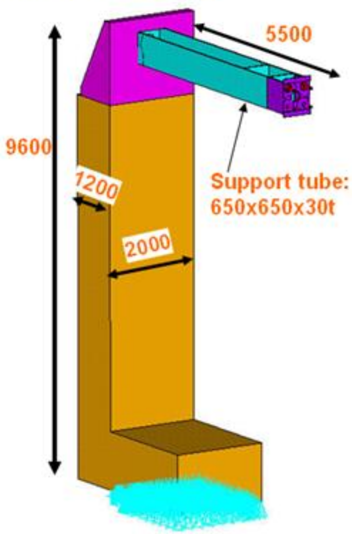




ILD FD stability analysis results



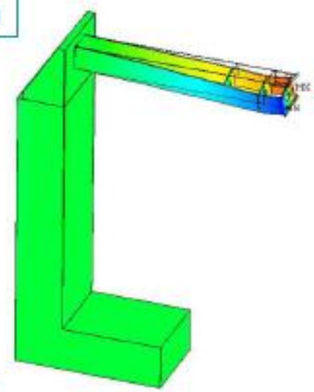
ANSYS model



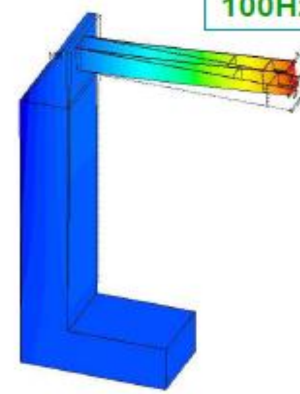
Results: Responded amplitude at each resonance.

@ KEK-ATF	
0.1Hz	1e-5m/s^2
1Hz	6e-4m/s^2
10Hz	6e-4m/s^2
100Hz	2e-3m/s^2

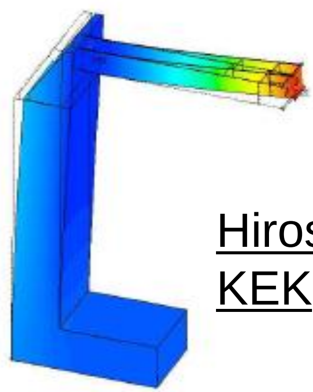
4.5Hz
1.5nm



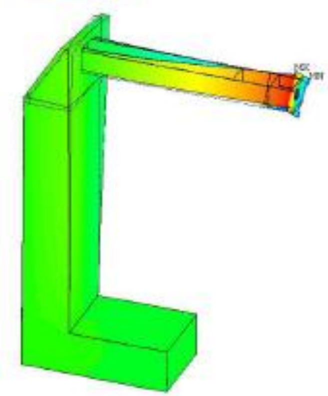
7.9Hz
240nm



10.4Hz
50nm



13.6Hz
0.3nm



Hiroshi Yamaoka, KEK

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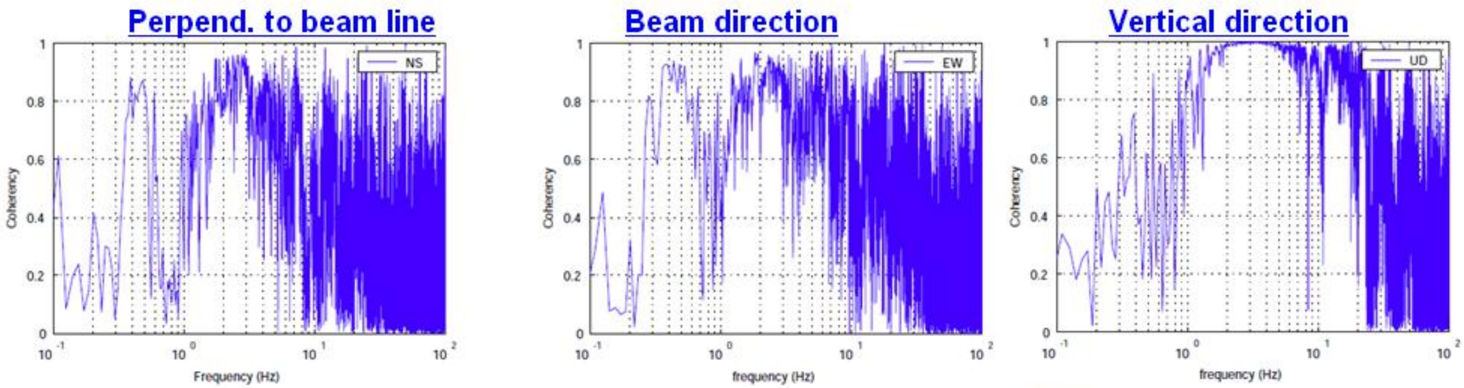
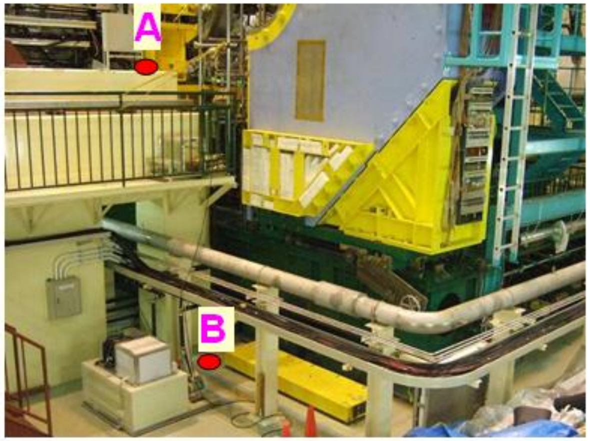
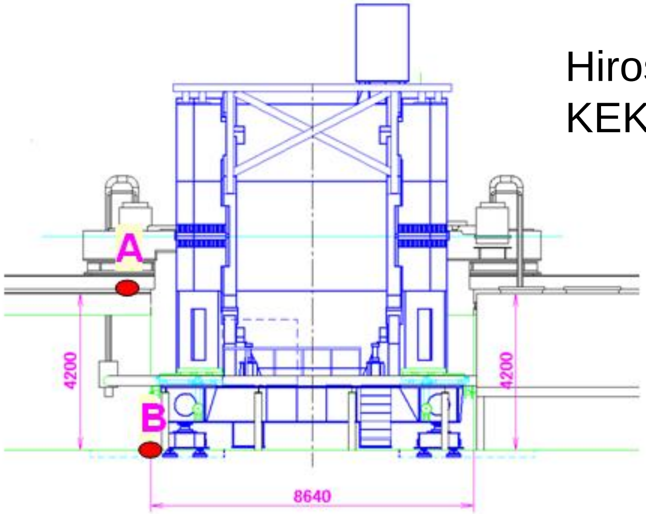
Stability studies at BELLE

Measurement: B

How is the coherency between the tunnel and floor?







Hiroshi Yamaoka, KEK

- Horizontal dir.: 0.~Hz, ~3Hz
- Vertical dir.: 1 ~ 20Hz

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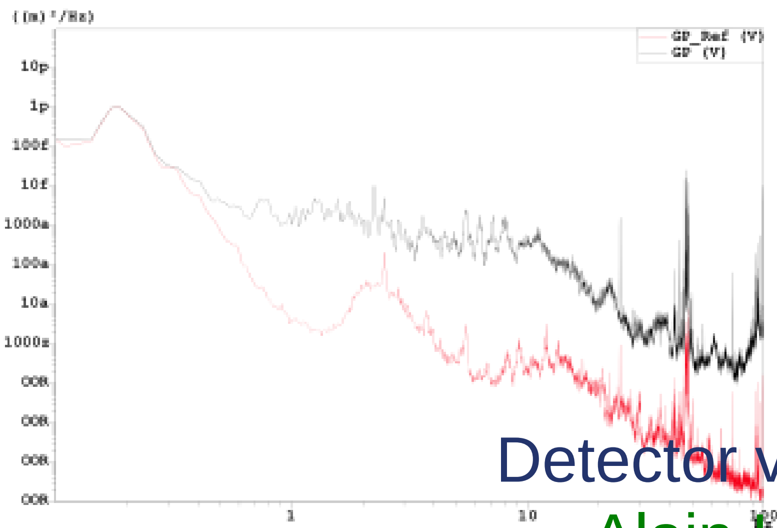
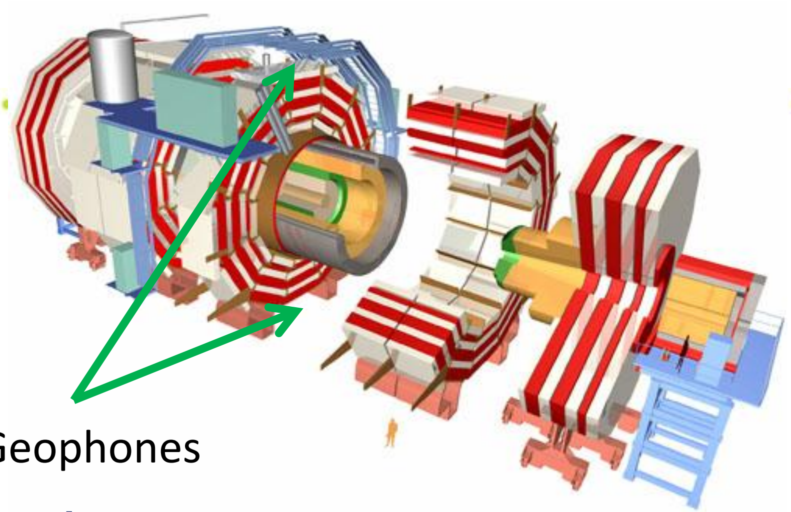
CMS top of Yoke measurement

PSD of the signals Vertical direction



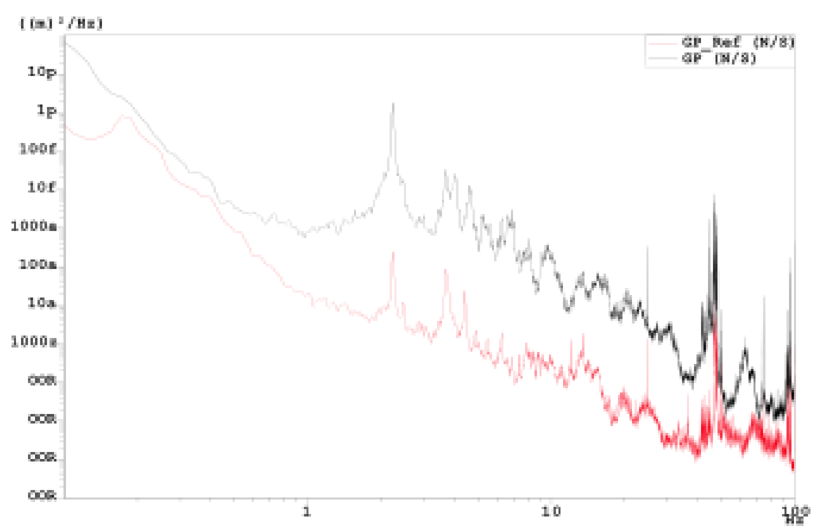


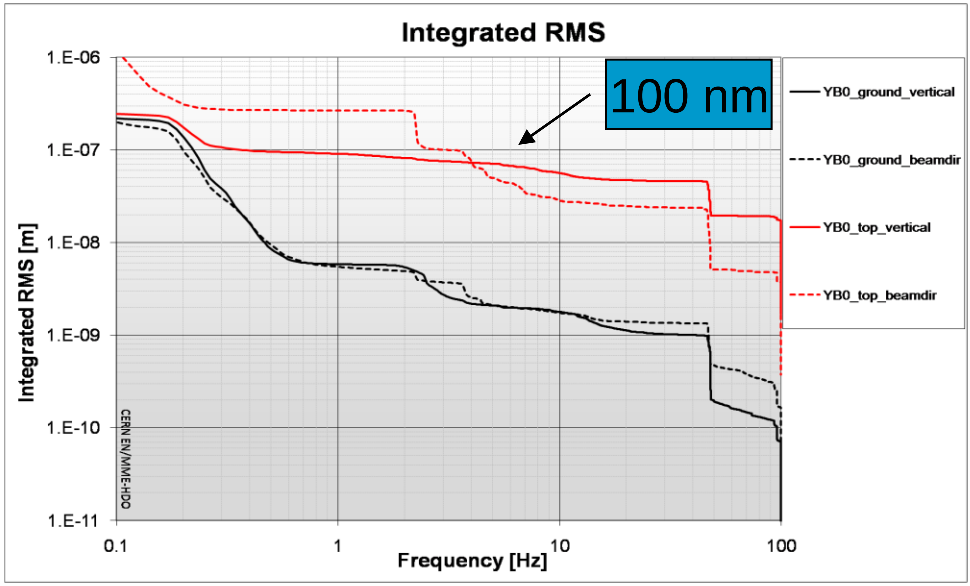
Detector vibrations and QD0 support

Alain Herve (ETH Zurich)

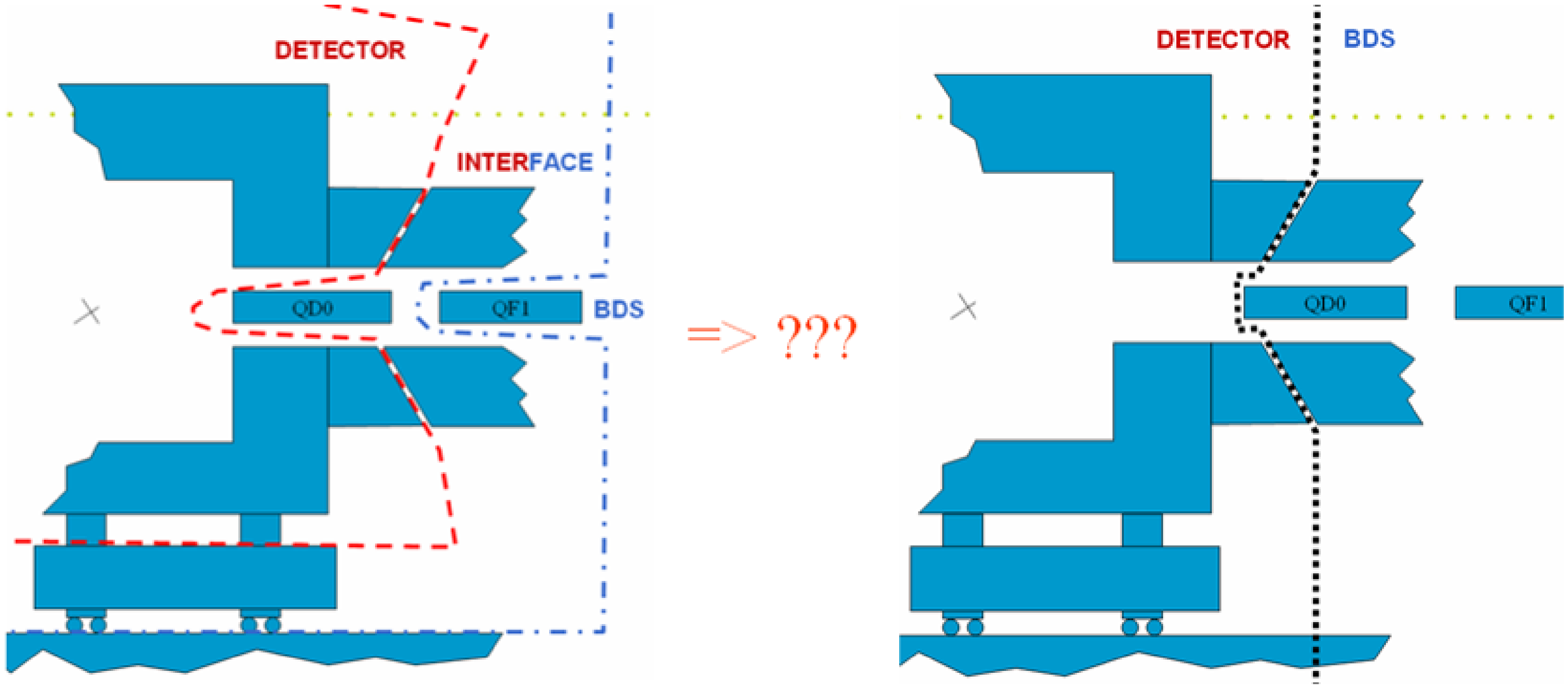
Cooling system OFF

PSD of the signals Beam direction





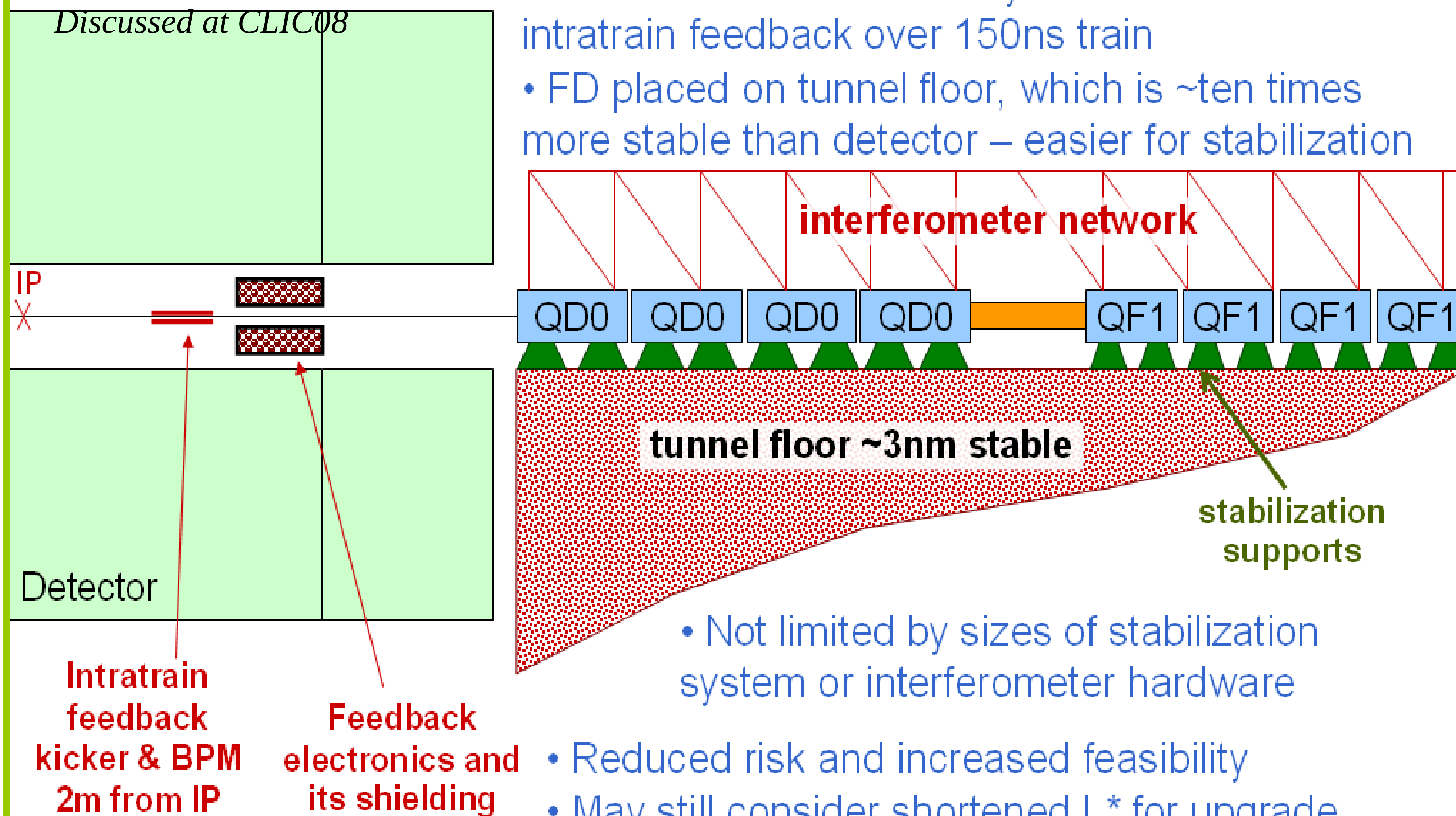
Longer L* → Simplified MDI?



- If doubled L* is feasible and acceptable then the MDI may be simplified tremendously
  - » and cost is reduced – do not need two extra sets of QD0
- An option of later upgrade for shorter L* may always be considered
- Has to be studied further

Doubled L* perhaps **necessary** for CLIC, where the FD stability requirement is ~0.1 nm

- Slower than 1/L* dependence of Lum => ↑L*
- Reduced feedback latency – several iteration of intratrain feedback over 150ns train
- FD placed on tunnel floor, which is ~ten times more stable than detector – easier for stabilization



- Not limited by sizes of stabilization system or interferometer hardware
- Reduced risk and increased feasibility
- May still consider shortened L* for upgrade

CLIC BDS & L* (IPAC10 paper)

FFS WITH L*=6M

In [12] it was proposed to use a longer L* to ease the QD0 stabilization challenge by supporting the FD on the tunnel. The initial lattice featured a L*=8m with about 30% lower luminosity than the current design and tighter pre-alignment tolerances to guarantee a successful tuning [2]. In the meantime the CLIC experiments have proposed to reduce the length of the detector to 6 m [13]. Consequently a new FFS has been designed with an L*=6m by scaling the old CLIC FFS with L*=4.3 m [14]. This lattice currently features IP spot sizes of $\sigma_x = 60.8$ nm and $\sigma_y = 1.9$ nm. Table 1 shows the total and energy peak luminosities for the different available FFS systems. Luminosity clearly decreases as L* increases. The L*=6 m case has a 16% lower peak luminosity than the nominal one (L*=3.5 m). Figure 5 displays the luminosity versus relative energy offset for all the FFS designs, showing a similar energy bandwidth in all cases.

L* $[m]$	Total luminosity $[10^{34} cm^{-2} s^{-1}]$	Peak luminosity $[10^{34} cm^{-2} s^{-1}]$
3.5	6.9	2.5
4.3	6.4	2.4
6	5.0	2.1
8	4.0	1.7

Table 1: Total and Peak luminosities for different L* lattices.

[12] A. Seryi, "Near IR FF design including FD and longer L* issues", CLIC08.

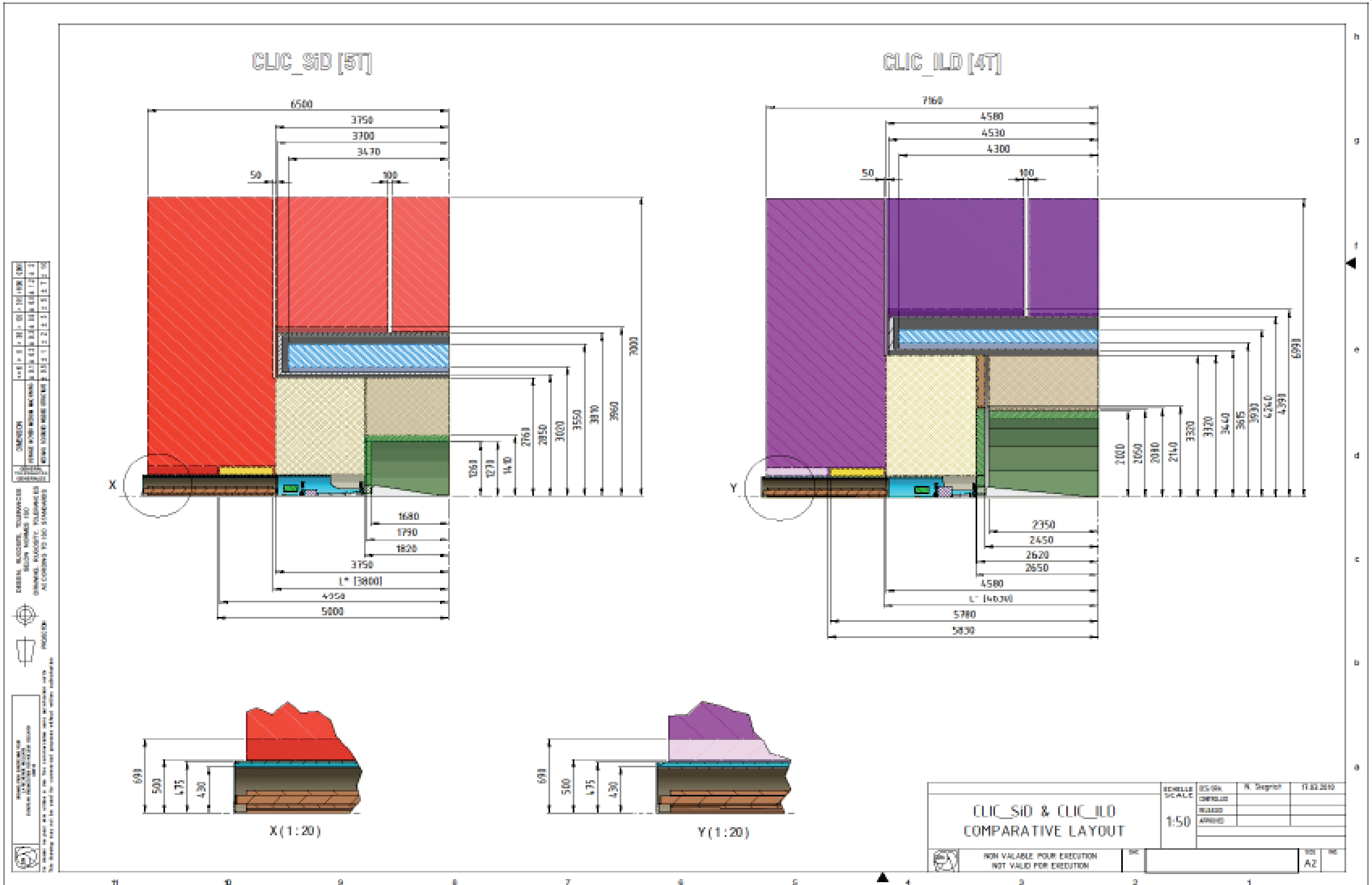
[13] CLIC09 Workshop, 12-16 October 2009, CERN , http://indico.cern.ch/conferenceDisplay.py?confId=45580

[14] http://clicr.web.cern.ch/CLICr/

The CLIC Beam Delivery System towards the Conceptual Design Report

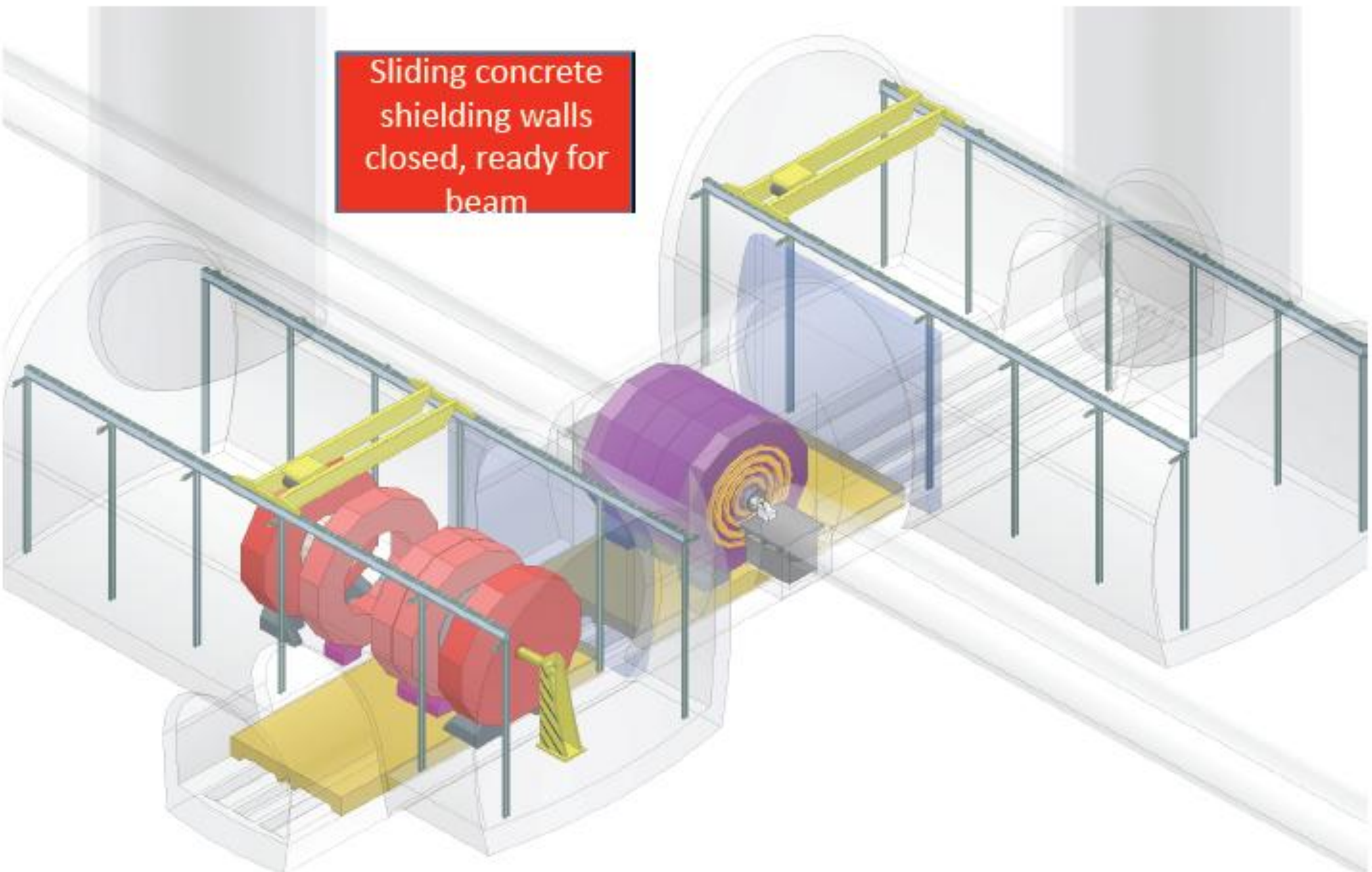
D. Angal-Kalinin, B. Bolzon, B. Dalena, L. Fernandez, F. Jackson, A. Jeremie, B. Parker
J. Resta López, G. Rumolo, D. Schulte, A. Seryi, J. Snuverink, R. Tomás and G. Zamudio

CLIC detector comparison



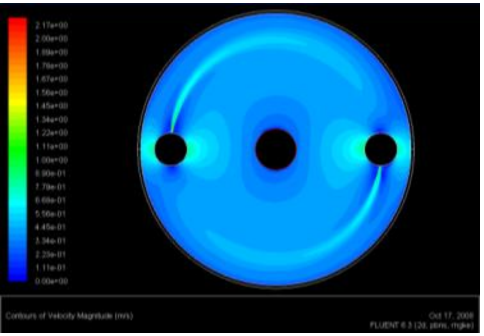
New concept of CLIC push-pull

Experiment 2 sliding on IP, shielding walls closed



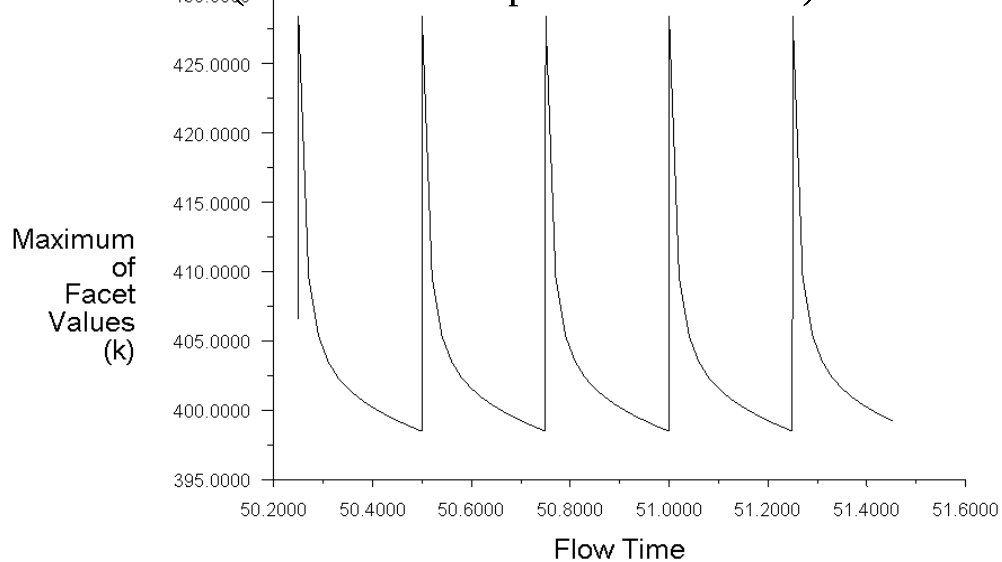
March 28, 10 H. Gerwig - LCWS10/ILC10 28

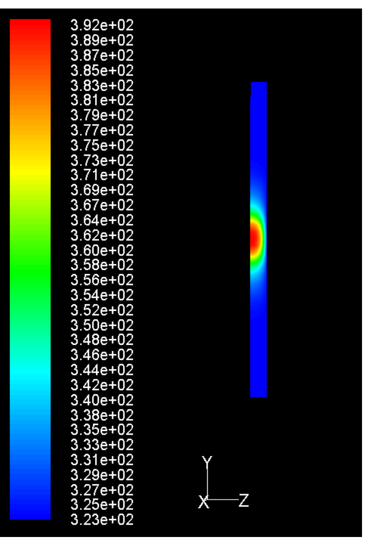
Beam dump design updates



Velocity contours (inlet velocity: 2.17m/s, mass flux: 19kg/m/s)

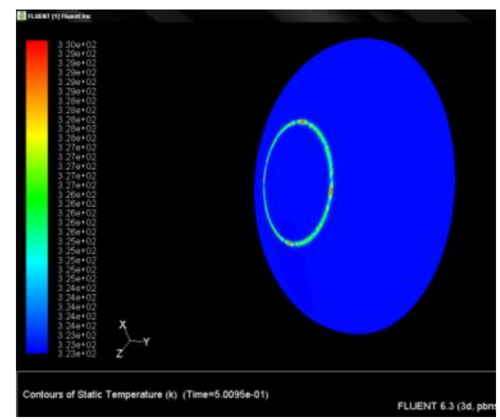
Maximum temperature variation as a function of time at z = 2.9m ≡ 8.1Xo (Maximum temperature = 155^{0}C)





Temperature distribution across the cross-section of the End plate

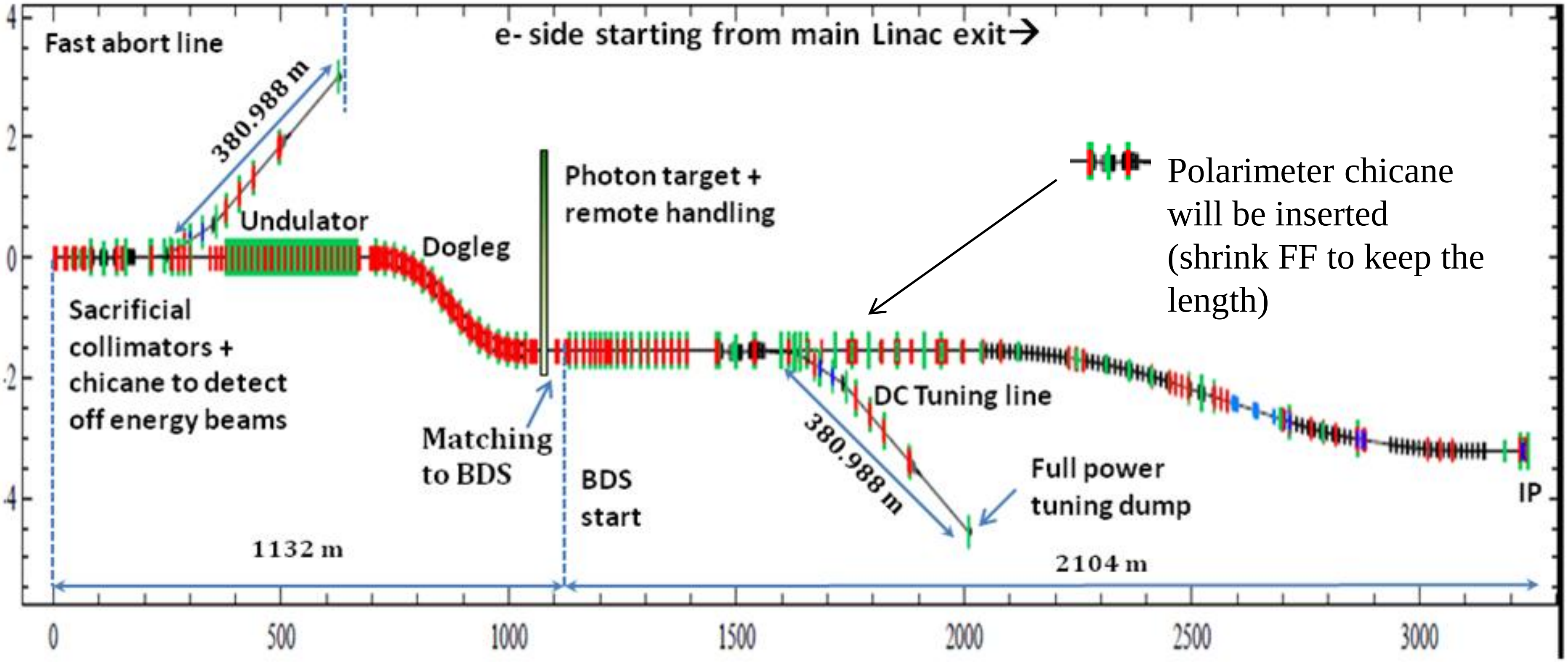
Window temperature distribution just when the beam train completes energy deposition. (Max temp : 57^{0}C)



D. Walz , J. Amann, et al, SLAC
P. Satyamurthy, P. Rai, V. Tiwari, K. Kulkarni, BARC, Mumbai, India

From IPAC10 paper

e- BDS reconfiguration for SB2009



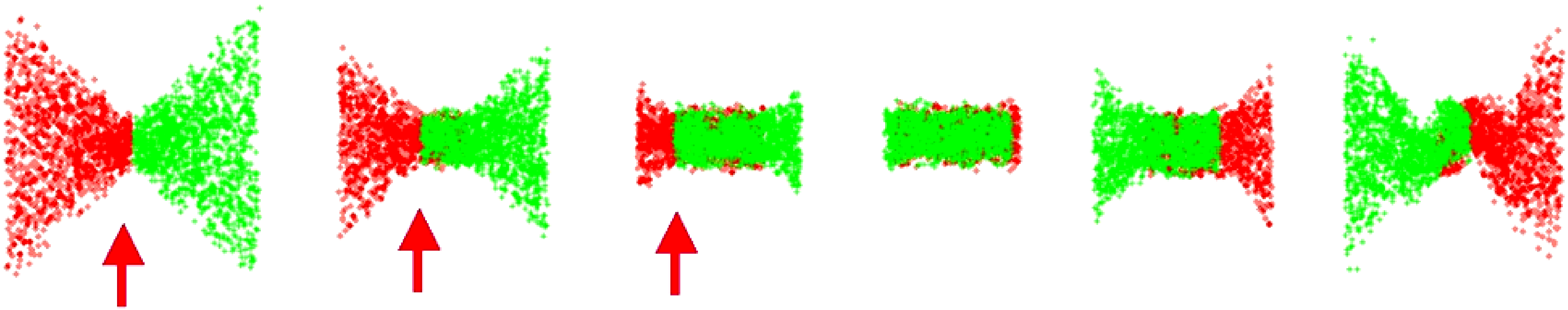
- The central integration includes the sources in the same tunnel as the BDS. Relocation of the positron production system to the downstream end of the electron linac means placing it just before the beginning of the electron BDS. These changes need suitable design modifications to the layout of this area. Figure above shows the proposed new layout of the electron BDS

ILC Nominal and Low Power RDR

	Nom. RDR	Low P RDR
Case ID	**1**	**2**
E CM (GeV)	500	500
N	2.0E+10	2.0E+10
n_b	2625	1320
F (Hz)	5	5
P_b (MW)	**10.5**	**5.3**
$\gamma\varepsilon_X$ (m)	1.0E-05	1.0E-05
$\gamma\varepsilon_Y$ (m)	4.0E-08	3.6E-08
βx (m)	2.0E-02	1.1E-02
βy (m)	4.0E-04	2.0E-04
Z-distribution *	Gauss	Gauss
σ_x (m)	6.39E-07	4.74E-07
σ_y (m)	5.7E-09	3.8E-09
σ_z (m)	3.0E-04	2.0E-04
Guinea-Pig $\delta E/E$	**0.023**	**0.045**
Guinea-Pig L ($cm^{-2}s^{-1}$)	**2.02E+34**	**1.86E+34**
Guinea-Pig Lumi in 1%	1.50E+34	1.09E+34

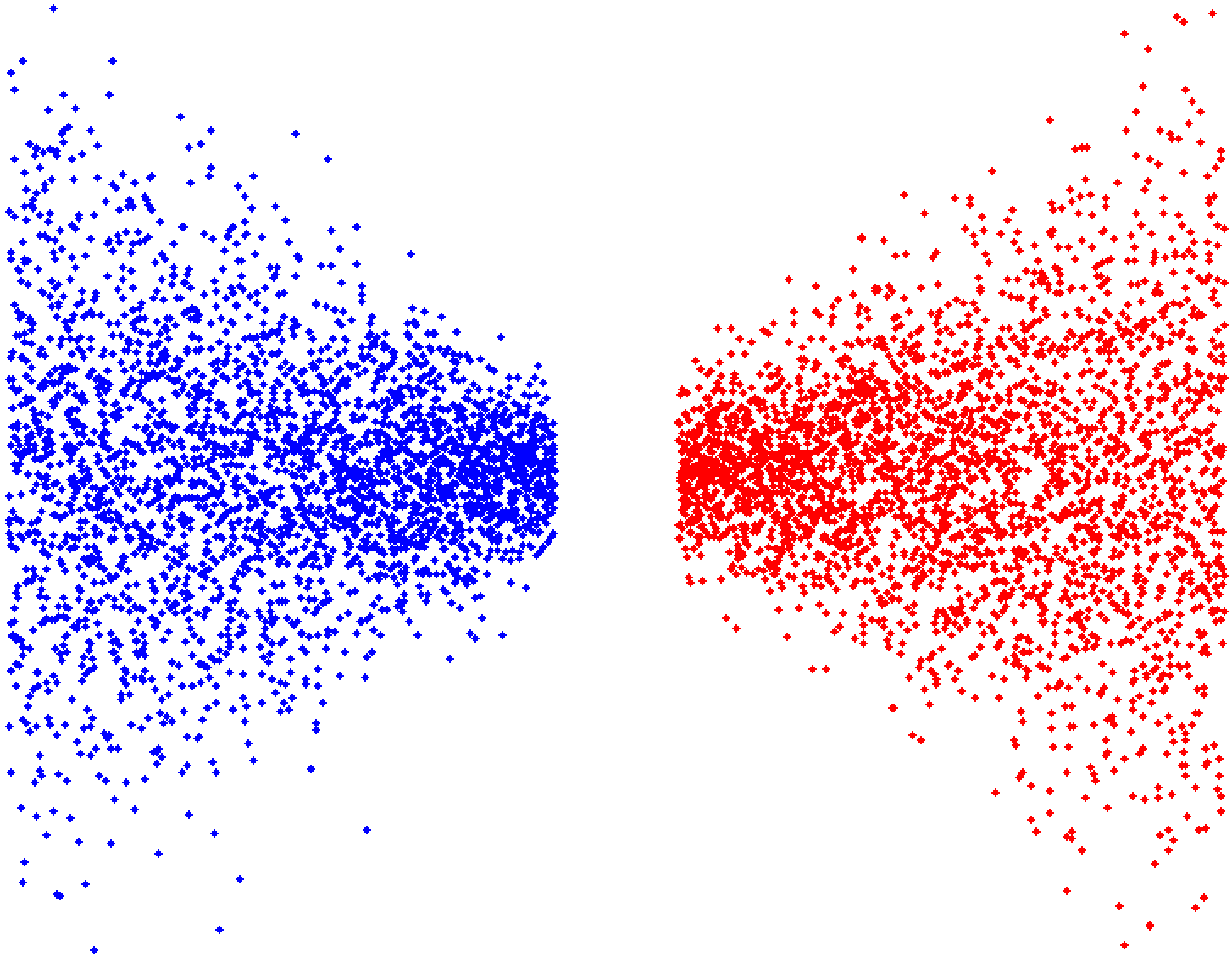
* The RDR "low power" option has large "beamstrahlung energy spread" (beam-beam phenomena) and cause larger background in detectors

Beam-beam: Travelling focus



- Suggested by V.Balakin in ~1991 – idea is to use beam-beam forces for additional focusing of the beam – allows some gain of luminosity or overcome somewhat the hour-glass effect
- Figure shows simulation of traveling focus. The arrows show the position of the focus point during collision
- So far not yet used experimentally

Collision with travelling focus



New Low P parameter set

	Nom. RDR	Low P RDR	new Low P
Case ID	**1**	**2**	**3**
E CM (GeV)	500	500	500
N	2.0E+10	2.0E+10	2.0E+10
n_b	2625	1320	1320
F (Hz)	5	5	5
P_b (MW)	**10.5**	**5.3**	**5.3**
$\gamma\varepsilon_X$ (m)	1.0E-05	1.0E-05	1.0E-05
$\gamma\varepsilon_Y$ (m)	4.0E-08	3.6E-08	3.6E-08
βx (m)	2.0E-02	1.1E-02	1.1E-02
βy (m)	4.0E-04	2.0E-04	2.0E-04
Travelling focus	No	No	**Yes**
Z-distribution *	Gauss	Gauss	Gauss
σ_x (m)	6.39E-07	4.74E-07	4.74E-07
σ_y (m)	5.7E-09	3.8E-09	3.8E-09
σ_z (m)	3.0E-04	2.0E-04	3.0E-04
Guinea-Pig $\delta E/E$	**0.023**	**0.045**	**0.036**
Guinea-Pig L ($cm^{-2}s^{-1}$)	**2.02E+34**	**1.86E+34**	**1.92E+34**
Guinea-Pig Lumi in 1%	1.50E+34	1.09E+34	1.18E+34

*for flat z distribution the full bunch length is $\sigma_z*2*3^{1/2}$

Travelling focus allows to lengthen the bunch

Thus, beamstrahlung energy spread is reduced

Focusing during collision is aided by focusing of the opposite bunch

Focal point during collision moves to coincide with the head of the opposite bunch

RDR & SB2009 Parameters

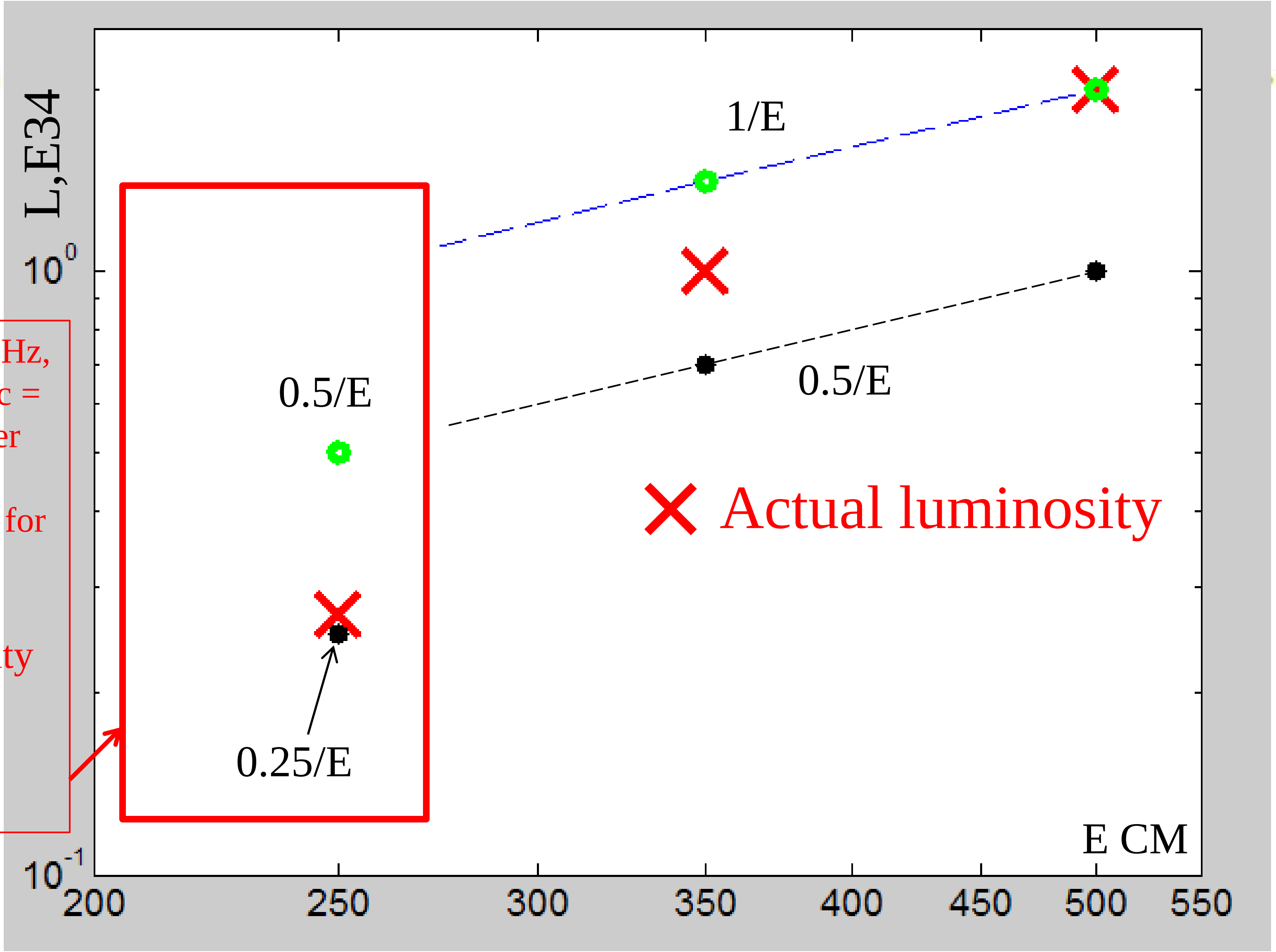
Table from the "Physics Questions Committee's Status Report" provided to the SB2009 WG (B. Foster (Co-Chair), A. Seryi (Co-Chair), J. Clarke, M. Harrison, D. Schulte, T. Tauchi. ~Dec 2009

	RDR			SB2009 w/o TF				SB2009 w TF			
CM Energy (GeV)	250	350	500	250.a	250.b	350	500	250.a	250.b	350	500
Ne- ($*10^{10}$)	2.05	2.05	2.05	2	2	2	2.05	2	2	2	2.05
Ne+ ($*10^{10}$)	2.05	2.05	2.05	1	2	2	2.05	1	2	2	2.05
nb	2625	2625	2625	1312	1312	1312	1312	1312	1312	1312	1312
Tsep (nsecs)	370	370	370	740	740	740	740	740	740	740	740
F (Hz)	5	5	5	5	2.5	5	5	5	2.5	5	5
γex ($*10^{-6}$)	10	10	10	10	10	10	10	10	10	10	10
γey ($*10^{-6}$)	4	4	4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
βx	22	22	20	21	21	15	11	21	21	15	11
βy	0.5	0.5	0.4	0.48	0.48	0.48	0.48	0.2	0.2	0.2	0.2
σz (mm)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
σx eff ($*10^{-9}$ m)	948	802	639	927	927	662	474	927	927	662	474
σy eff ($*10^{-9}$ m)	10	8.1	5.7	9.5	9.5	7.4	5.8	6.4	6.4	5.0	3.8
L (10^{34} cm^{-2}s^{-1})	0.75	1.2	2.0	0.2	0.22	0.7	1.5	0.25	0.27	1.0	2.0

Rate at IP = 2.5Hz,
Rate in the linac = 5Hz (every other pulse is at 150GeV/beam, for e+ production)

Low luminosity at this energy reduces the physics reach

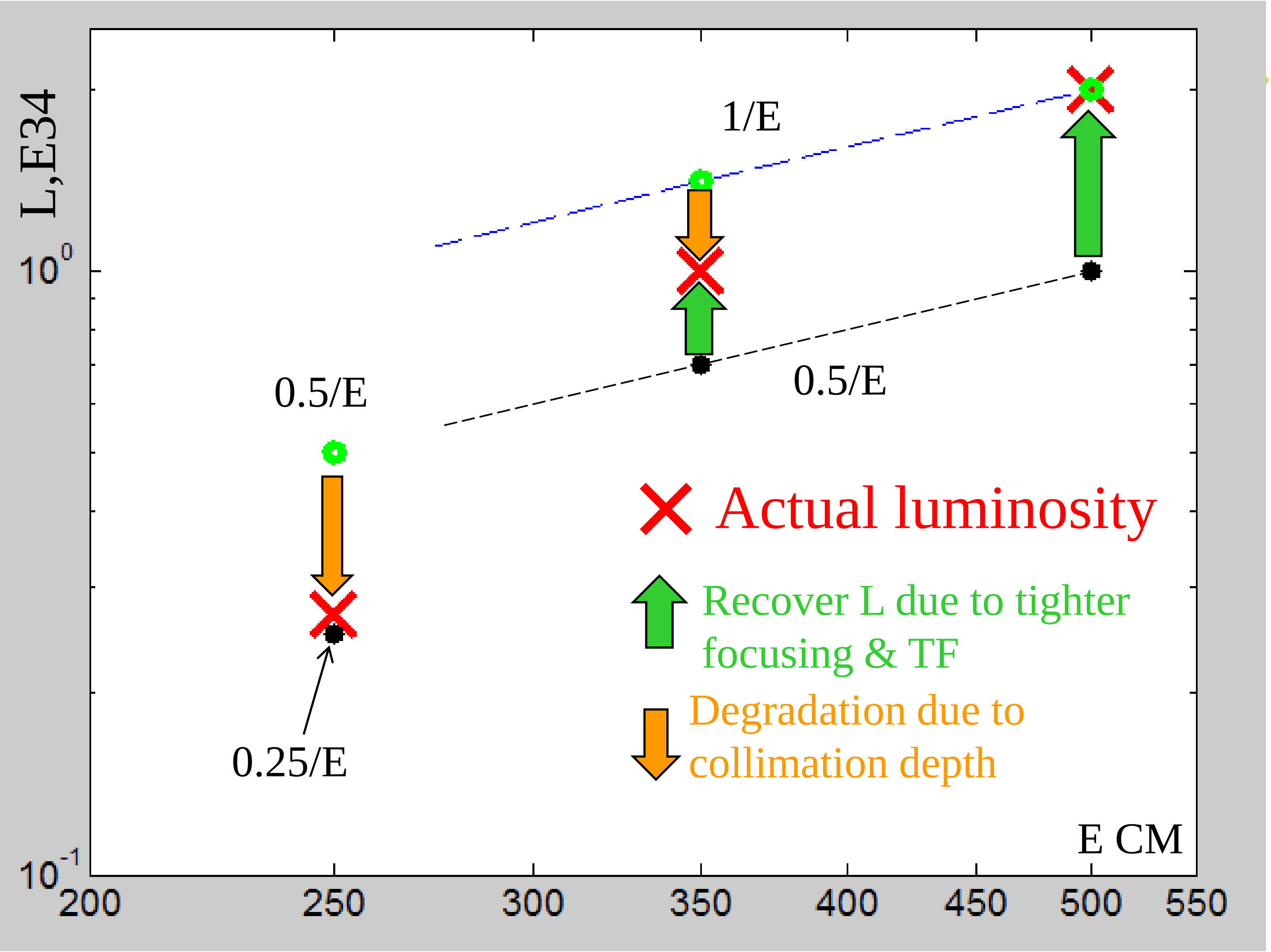
SB2009 Lumi



Rate at IP = 2.5Hz, Rate in the linac = 5Hz (every other pulse is at 150GeV/beam, for e+ production)

Low luminosity at this energy reduces the physics reach

SB2009 Lumi



L,E34
10^0
10^{-1}
1/E
0.5/E
0.5/E
0.25/E
Actual luminosity
Recover L due to tighter focusing & TF
Degradation due to collimation depth
E CM
200
250
300
350
400
450
500
550

Lumi(E) dependence in SB2009

- Factor determine shape of L(E) in SB2009
  - Lower IP rep (/2) rate below ~125GeV/beam
  - Collimation effects: increased beam degradation at lower E due to collimation wakes and due to limit (in X) on collimation depth

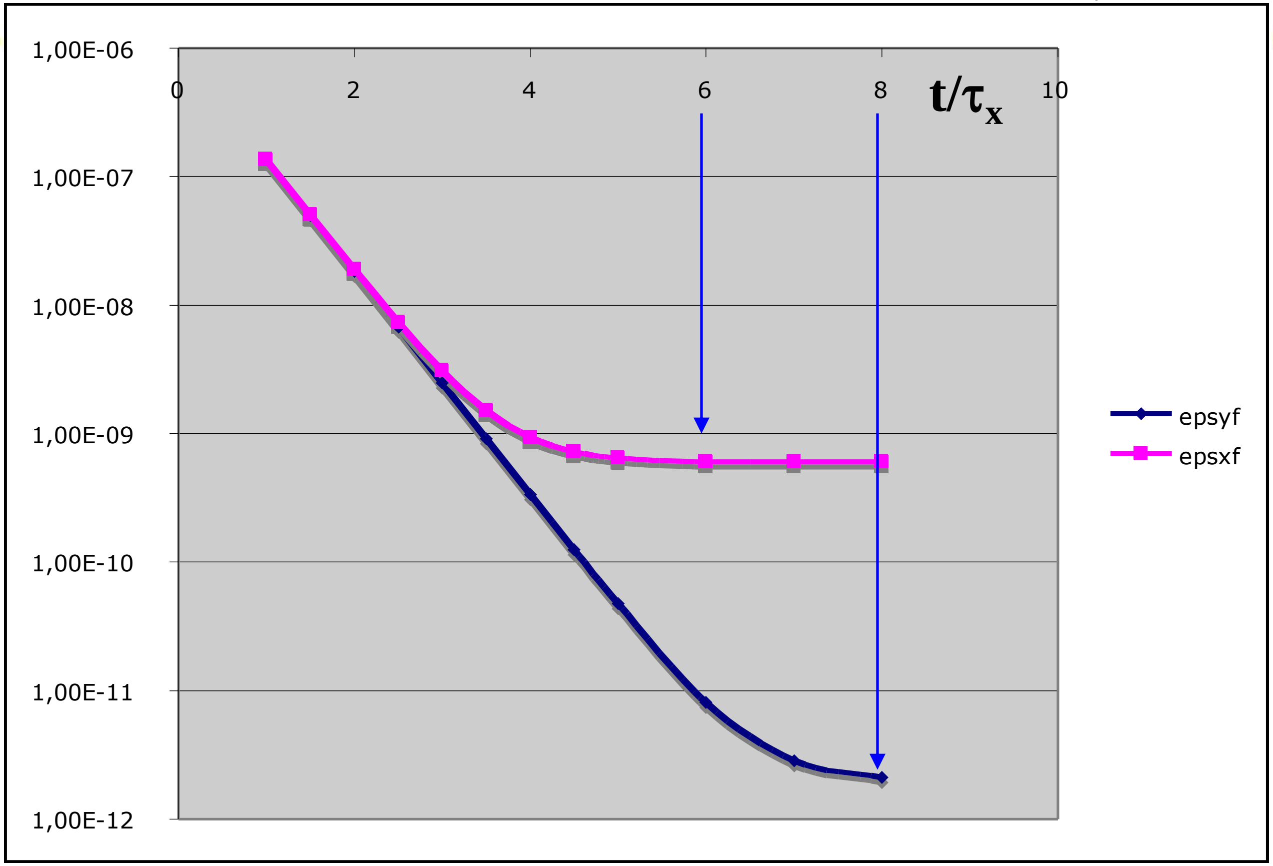
- Understanding the above limitations, one can suggest mitigation solutions:
  - 1) Consider doubling the rep rate at lower energy
  - 2) Consider Final Doublet optimized for 250GeV CM

Work on mitigations of L(E) with SB2009 during ILC2010

- Have initiated discussion of double rep rate ~month before the ILC2010 (March 2010)
- Doubling the rep rate (below ~125GeV/beam)
  - BDS WG discussed implications with other Working Groups:
    - DR => OK! (new conceptual DR design was presented!)
    - Sources => OK!
    - Linac, HLRF, Cryogenics => OK!
- FD optimized for ~250GeV CM
  - Shorter FD reduce beam size in FD and increase collimation depth, reducing collimation related beam degradation
  - Will consider exchanging FD for low E operation or a more universal FD that can be retuned

Emittance damping

S. Guiducci (LNF)



8 damping times are needed for the vertical emittance

5 Hz ⇒ τ_x = 26 ms

10 Hz ⇒ τ_x = 13 ms

DR Parameters for 10 Hz Operation

S. Guiducci (LNF) et al

	RDR	TILC08	SB2009	High Rep
Circumference (m)	6695	6476	3238	3238
Damping time τ_x (ms)	25.7	21	24	13
Emittance ε_x (nm)	0.51	0.48	0.53	0.57
Emittance ε_y (pm)	2	2	2	2
Energy loss/turn (MeV)	8.7	10.3	4.4	8.4
Energy spread	1.3×10^{-3}	1.3×10^{-3}	1.2×10^{-3}	1.5×10^{-3}
Bunch length (mm)	9	6	6	6
RF Voltage (MV)	24	21	7.5	13.4
Average current (A)	0.40	0.43	0.43	0.43
Beam Power (MW)	3.5	4.4	1.9	3.6
N. of RF cavities	18	16	8	16
B wiggler (T)	1.67	1.6	1.6	2.4
Wiggler period (m)	0.4	0.4	0.4	0.28
Wiggler length (m)	2.45	2.45	2.45	1.72
Total wiggler length (m)	200	216	78	75
Number of wigglers	80	88	32	44

Energy = 5 GeV

DR (3.2km) at 10Hz is feasible

N. of RF cavities $8 \Rightarrow 16$ Wiggler field $1.6 \Rightarrow 2.4$ T Wiggler period $0.4 \Rightarrow 0.28$ m

Double rep rate: Sources

- Electron Source:
  - doubling rep rate is not critical
    [Axel Brachmann, Tsunehiko Omori et al]
- Positron Source:
  - For SB2009 250b case there should be no issues
    - For 250a, which is not a preferred solution, the most important consequence of the increased rep rate will be the increased average power on the positron target
    - Even for this case there is a hope that it can be managed, but need more detailed studies [Jim Clarke, Wei Gai, et al]
  - (June 3, 2010: N.J.Walker: there should not be any issues either at 250a or 250b)

Linac and double rep rate

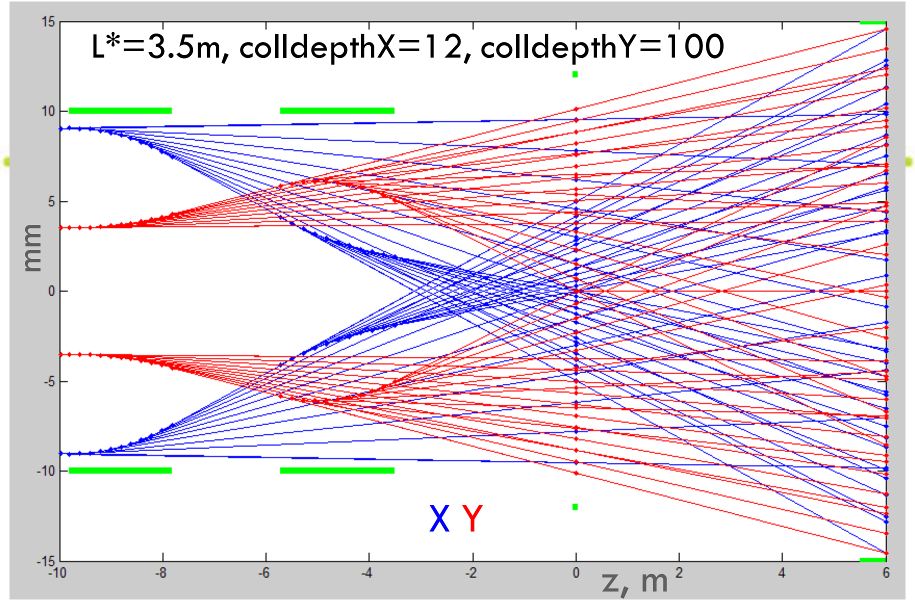
- At lower gradient, considering the cryo load (which should not be exceeded) and the efficiency of rf power sources (their efficiency decreases with power) concluded, that at 125 GeV/beam one can work at 10Hz rep rate in the linac
- At 150GeV/beam one can work at 8Hz in the linac
  - And this is possible only because the e+ source is at the end of the linac!

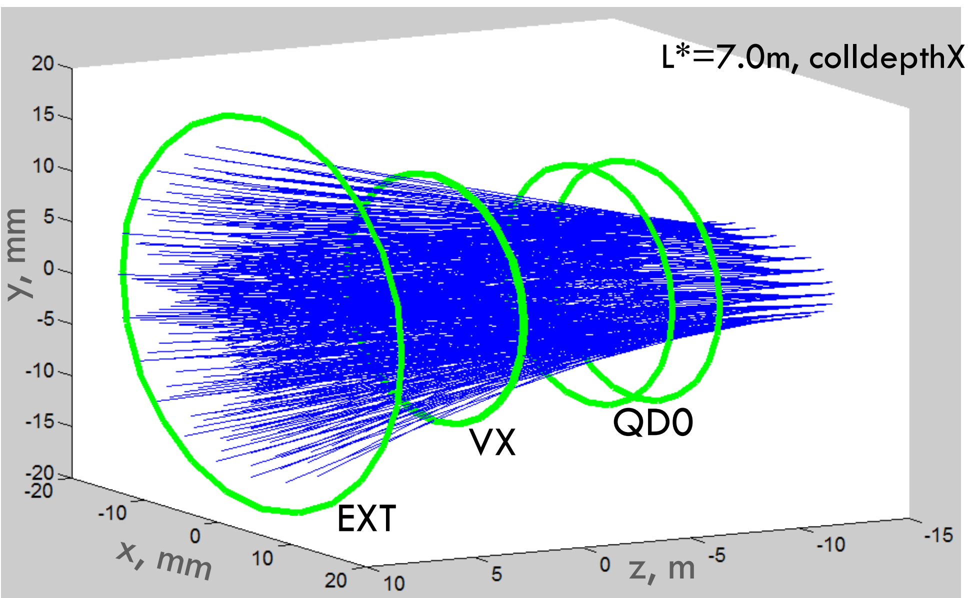
Chris Adolphsen, et al

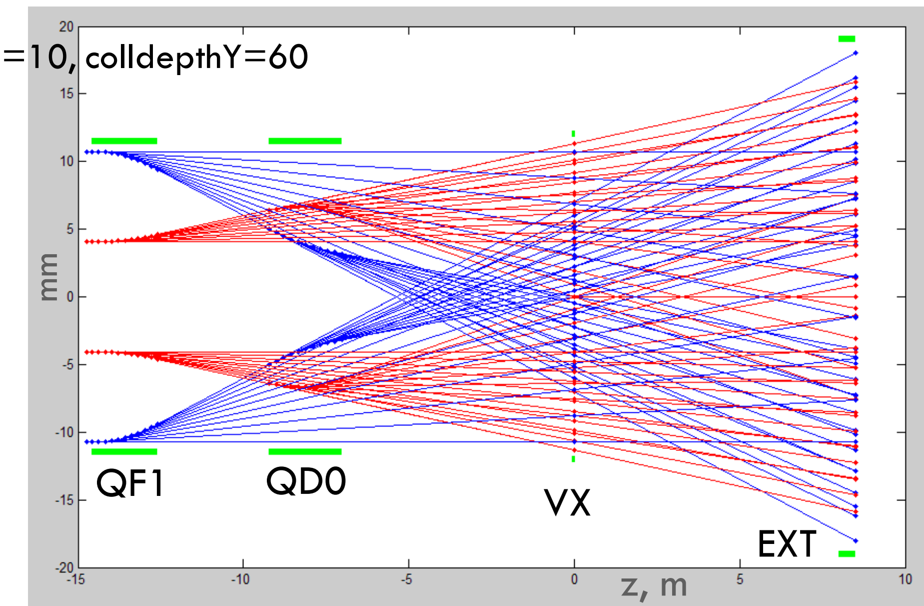
=> SB2009 OK for linac rep rate 10 Hz for 125 GeV/beam & 8 Hz for 150 GeV/beam

FD & collimation

- Reduced Collimation depth at lower E is responsible for large fraction of reduction of luminosity (w.r.to 1/E ideal curve)
- Shorter, matched to lower E, final doublet, will give some reduction of beam size at FD, thus increase the collimation depth





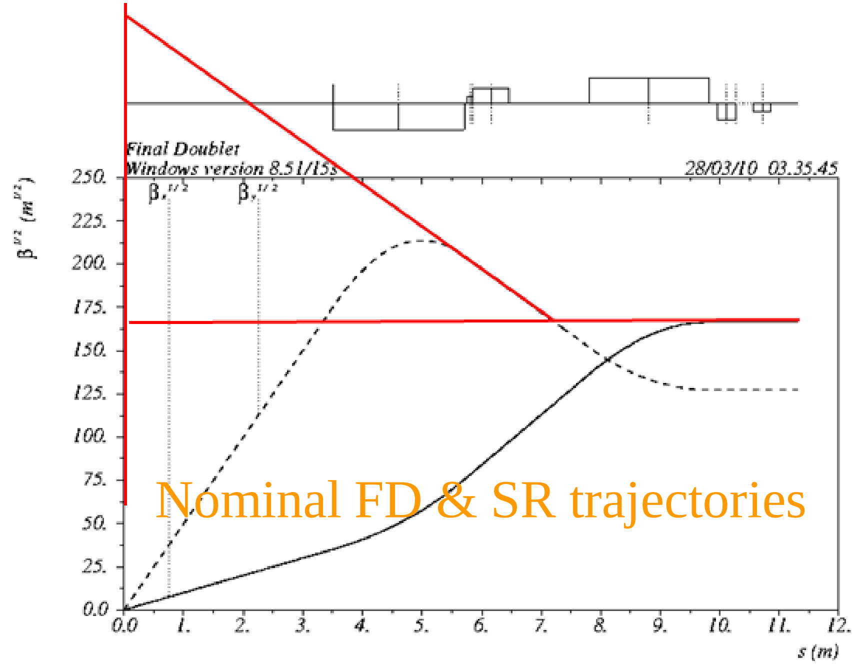


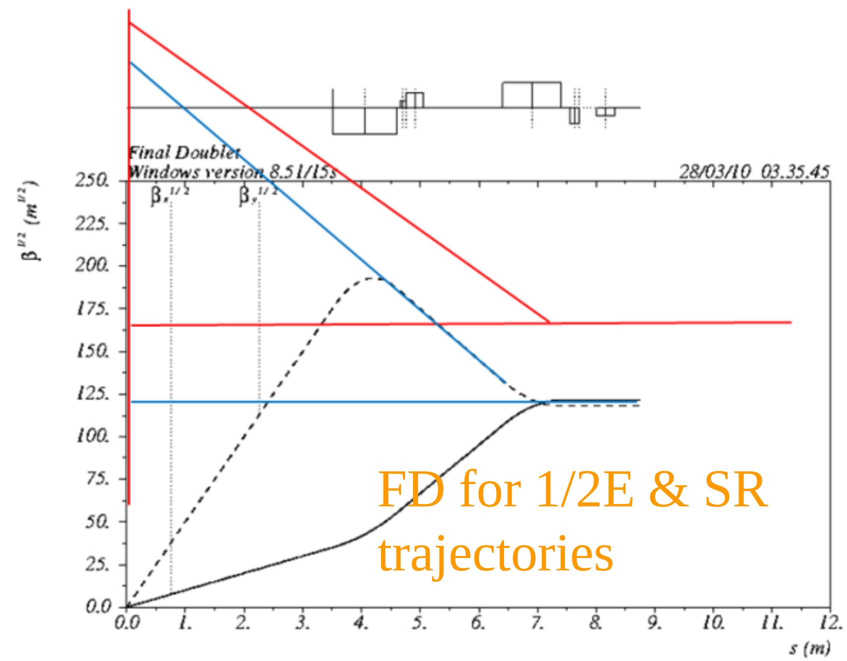
Rays show trajectories of possible SR photons. Amount of rays is not quantitative.

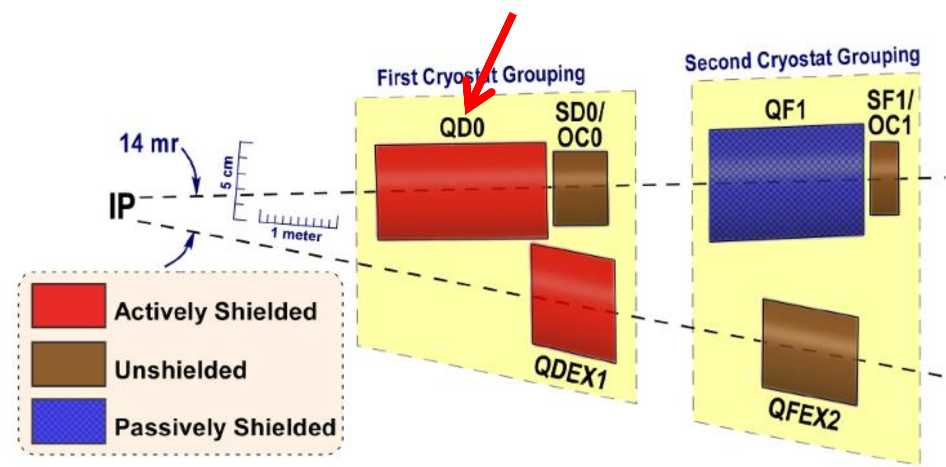
FD for low E

FD optimized for lower energy will allow increasing the collimation depth by ~10% in Y and by ~30% in X (Very tentative!)

- One option would be to have a separate FD optimized for lower E, and then exchange it before going to nominal E
- Other option to be studied is to build a universal FD, that can be reconfigured for lower E configuration (may require splitting QD0 coil and placing sextupoles in the middle)





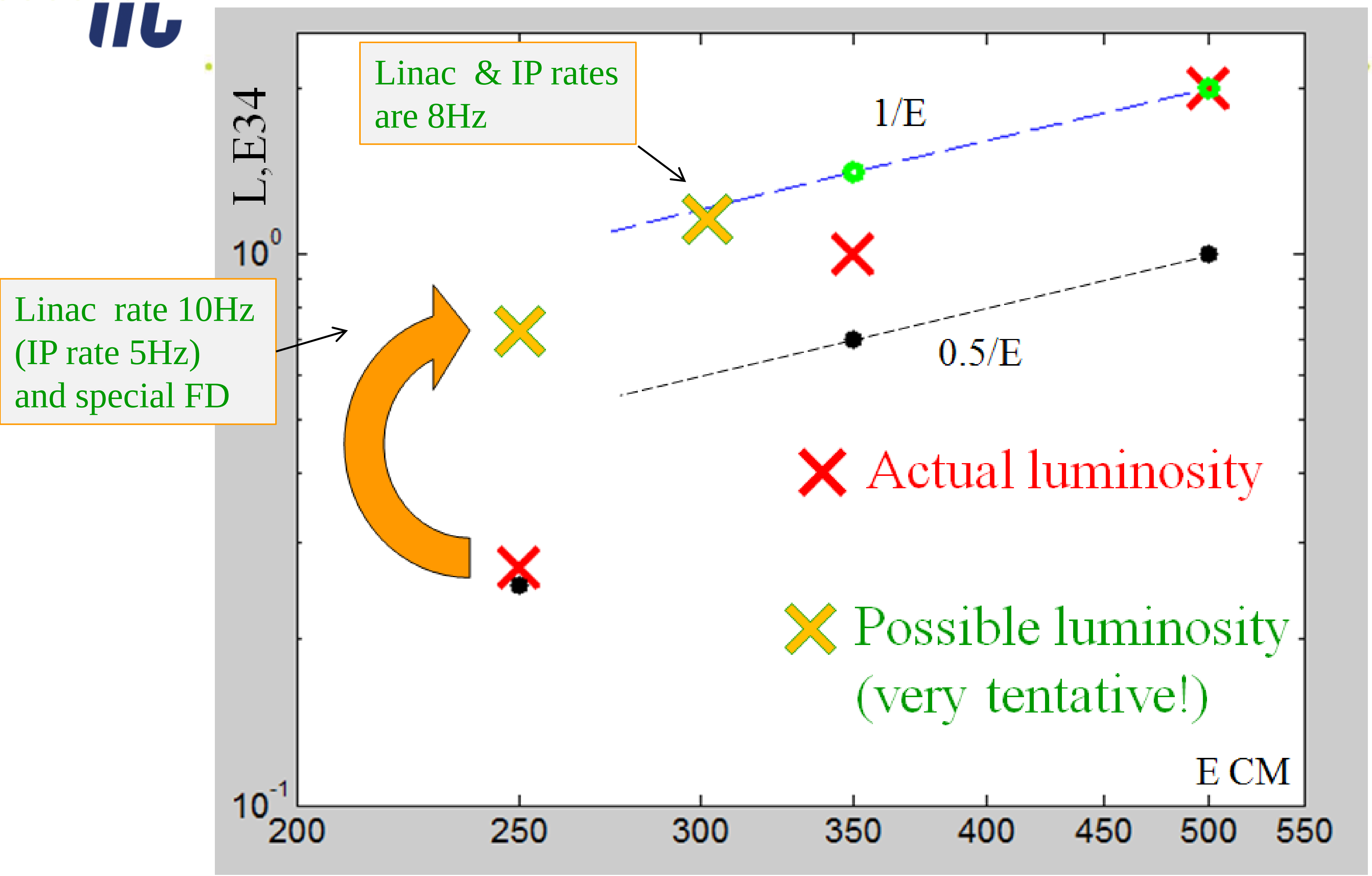


Beam Parameters & mitigation

	RDR			SB2009 w/o TF				SB2009 w TF			
CM Energy (GeV)	250	350	500	250.a	250.b	350	500	250.a	250.b	350	500
Ne- (*10^{10})	2.05	2.05	2.05	2	2	2	2.05	2	2	2	2.05
Ne+ (*10^{10})	2.05	2.05	2.05	1	2	2	2.05	1	2	2	2.05
nb	2625	2625	2625	1312	1312	1312	1312	1312	1312	1312	1312
Tsep (nsecs)	370	370	370	740	740	740	740	740	740	740	740
F (Hz)	5	5	5	5	2.5	5	5	5	2.5	5	5
γex (*10^{-6})	10	10	10	10	10	10	10	10	10	10	10
γey (*10^{-6})	4	4	4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
βx	22	22	20	21	21	15	11	21	21	15	11
βy	0.5	0.5	0.4	0.48	0.48	0.48	0.48	0.2	0.2	0.2	0.2
σz (mm)	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
σx eff (*10^{-9} m)	948	802	639	927	927	662	474	927	927	662	474
σy eff (*10^{-9} m)	10	8.1	5.7	9.5	9.5	7.4	5.8	6.4	6.4	5.0	3.8
L (10^{34} $cm^{-2}s^{-1}$)	0.75	1.2	2.0	0.2	0.22	0.7	1.5	0.25	0.27	1.0	2.0

- Tentative! At 250 GeV CM the mitigations may give
  - * 2 L due to double rep rate
  - * about 1.4 L due to FD optimized for low E

SB2009 Lumi



Linac & IP rates are 8Hz
1/E
L, E34
10^0
Linac rate 10Hz (IP rate 5Hz) and special FD
0.5/E
Actual luminosity
Possible luminosity (very tentative!)
E CM
10^{-1}
200
250
300
350
400
450
500
550

Evaluation of 10 Hz at low E – work in progress

Low-Energy Running at 10Hz

Last modified	By	Comments
7-Apr-2010	Nick Walker	Initial summary release with remaining action items
26-Mai-2010	Nick Walker	Updated in prepration for June 23rd ADI focus meeting Removed false statement concerning e- ring only needing modification Added action item to evaluate issues of running e+ ring empty for half the time Added specific line items for HLRF hardware (variants) and their status Added (red) comment to ML cryogenics that more detailed calculation should be made.

Snapshot at working materials of AD&I team
The 10Hz summary document in preparation for the next AD&I meeting on the 23.06 (N. Walker et al.)

Operations scenarios

300<=Ecm<=500	Nominal 5Hz operation at full positron current
250<=Emc<300	Gray zone. 10Hz operation possible; 8-10Hz alternative pulsing also possible.
Ecm<250	Alternative pulse scheme with 150 GeV pulse to make e+, followed by lower lumi production pulse at <=125 GeV. Electron linac pulsed at 8 -10 Hz (lumi rate 4-5Hz).

10Hz low-energy running

Technical status key:

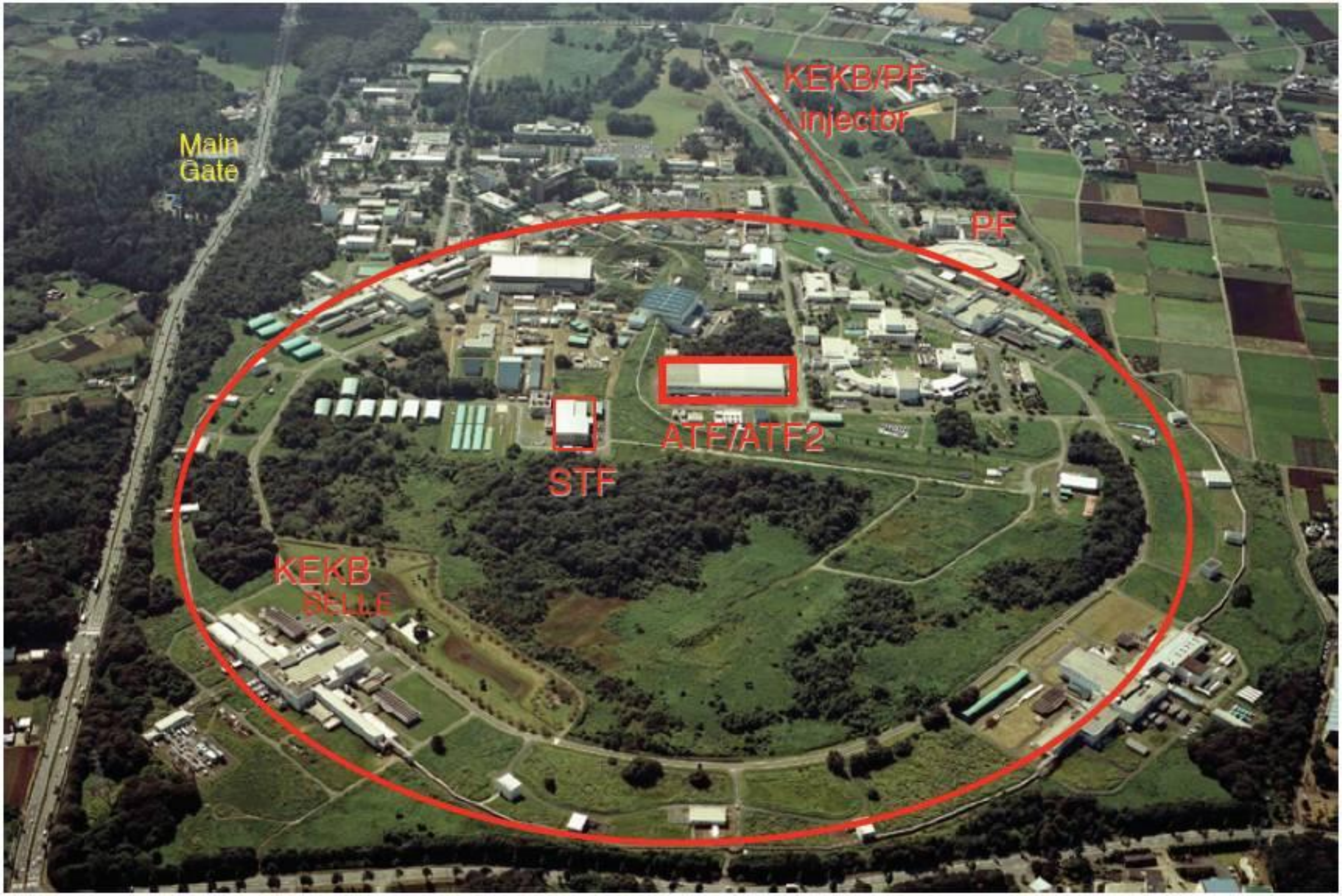
OK	Considered no problem
OK?	Expected to be no problem but requires further attention

AD&I team's
10Hz summary document in preparation for the AD&I meeting on the 23.06

		Tech. status	Incl. in cost diff			
Electron source						
	Laser	OK		Double rep. rate		
	Gun	OK		Double power		
		OK		Double water cooling		
	Warm RF	OK		Double power		
		OK		Double water cooling		
	5 GeV injector linac	OK	??	Double AC power to HLRF		
			??	Double cryogenic cooling		
Positron source						
	Photon collimator	??		Increase average power	See target comment below	Some consideration of the lumi production pulse is required here. If we assume no pulsed undulator bypass for this pulse, then there will be power on the target and the associated pair production to deal with. Where are these particles dumped? What additional activation do they produce? My assumption here is the FC and capture RF are only pulse at 5Hz, so the e± will be lose in the first DC magnet sections (although they are low
	Target	OK?		Increase average power	Needs quantification. 10Hz operation will have 150GeV beam + <=125 GeV, unless undulator bypass scheme for lumi beam is adopted.	
	FC	OK		No change	Runs at 5Hz (e+ production pulse)	
	Capture RF	OK		No change	Runs at 5Hz (e+ production pulse)	
	5 GeV injector linac	OK		No change	Runs at 5Hz (e+ production pulse)	
Damping ring						
	Double RF cavities (power)	OK	Yes			
	Increase wiggler B field by 44%	OK	Yes	increased DC power	Reduced dynamic aperture but still considered OK	
	Increase photon stop capacity (wiggler vacuum cham	OK	Yes			
	e+ rings runs empty half the time	??		Beamloading? thermal effects?		Need to catalogue possible issues and their mitigation.
Bunch Compressor					Only electron BC requires modification	
	Double AC power to HLRF	OK	??			
	Double cryogenic cooling	OK	??			
	Tune up dump capacity (power handling)			Dump is likely to need factor of two rating		
Main Linac					Only electron ML runs at 10Hz.	
	Cryogenic cooling	OK		No change	2K dynamic losses goes as G^2 so enough capacity at lower gradi	More detailed check should be made by Cryo experts.
	AC power	OK?		No change	Sufficient average AC power installed at lower gradients	Currently 8Hz appears to be the maximum. Look for ways to achieve full 10Hz.
	Water cooling (tunnel)	OK?		No change	Assumed sufficient - check	**To-date, consideration has been for 10MW MBK (RDR/KCS): checks need to be made for DRFS solution. (This is why technical status is indicated as 'OK?'.)**
	Water cooling (service)	OK?		No change	Assumed sufficient - check	
	HLRF	OK		8-10Hz operation	10MW MBK designed for 10Hz operation (running at TTF/FLASH)	
		OK		Bouncer Modulator	Design for 10Hz (running at TTF/FLASH)	
		OK?		Marx Modulator (KCS)	Should be OK but needs further consideration / demonstration	
		OK?		DRFS HLRF (modulator & klystron	Requires impact study similar. Estimation of efficiency.	Studies similar to those attached for 10MW MBK. Note this is basically the same as the comment above in bold.
BDS					Mostly no change	
					Collision (luminosity) rate is still 5Hz	Positron source region on e- side needs layout and design work to support alternative pulse scenario. Undulator bypass should also be considered.
	Dealing with 10Hz op in common e+ source region:					
	Emergency / tune-up dump	OK?		Assumed no change	Fast abort dump power handling requires review	
	Collimation (beam loss) in common lines	OK?		Assumed no change		
	Main High-Power Beam Dump	OK?		Lumi production beam is 4.2 MW (assuming nb=2630 with 4Hz operation and E=125 GeV)		**Where is the e+ generation pulse dumped? This is a 5 MW beam assuming full RDR bunch number (2630) and 4Hz operation.**
Beam Dynamics						
	Emittance and trajectory errors of e+ production beam (assumed higher energy pulse)	OK?		Further studies and a summary report are probably called for.		
Detector	Impact on detector (electronics etc.)	OK?		Added for completeness. Mainly impact on electronics etc.		Action item for MDI group

SB2009 & L at low E

- There are ways to increase L at low E which look promising and can be studied further
- The joint work of several Working Groups on double rep rate case during ILC2010 in March 2010 resulted in a good progress towards resolution of the issue
- AD&I team is making detailed evaluation of the impact of double rep-rate at low energy


Main
Gate
KEKB/PF
injector
PF
ATF/ATF2
STF
KEKB
BELLE

Accelerator Test Facility, KEK

1997-2008

Extraction line :utilization of low emittance beam
beam instrmentation, collimator damage

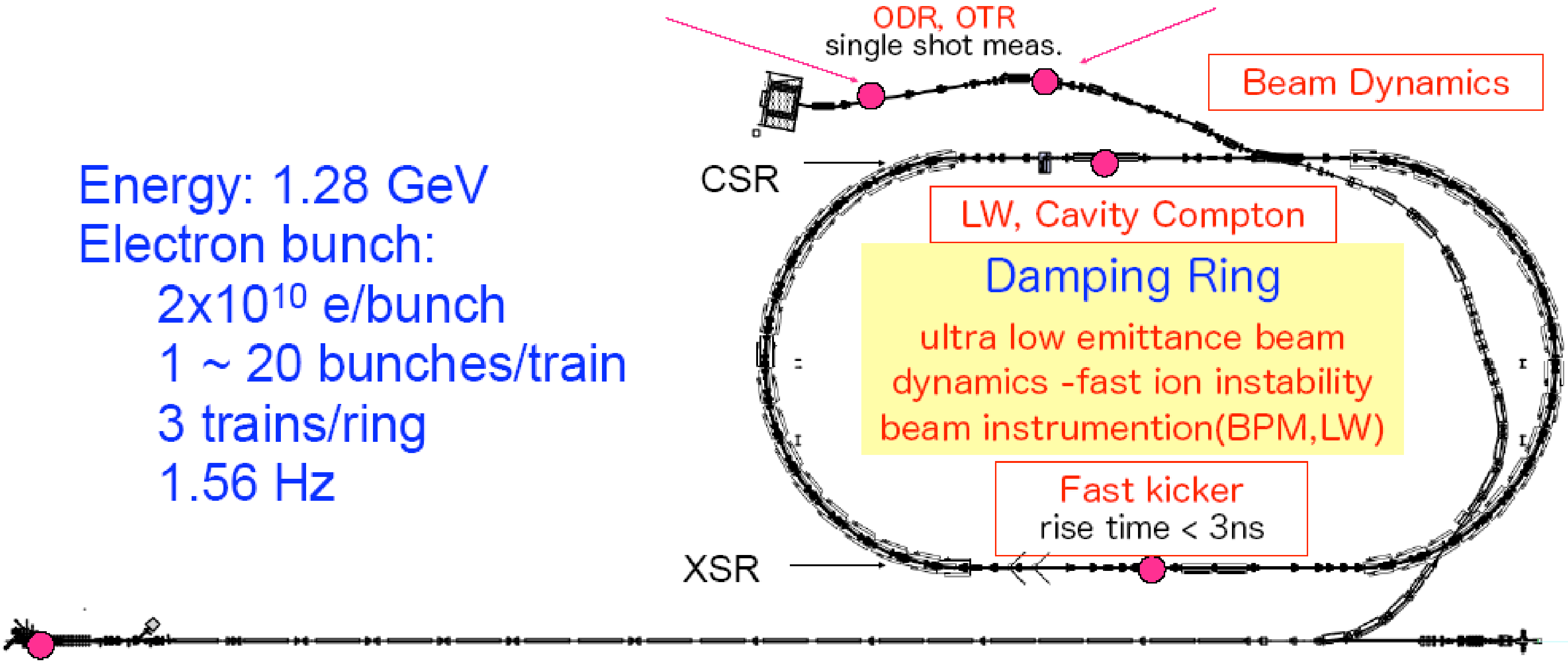
Cavity BPM
nanometer res.

FONT
fast feedback (ns)

Pulsed Laser Wire Scanner
for beam size monitor (μm)

Beam Dynamics

Energy: 1.28 GeV
Electron bunch:
- $2\text{x}10^{10}$ e/bunch
- 1 ~ 20 bunches/train
- 3 trains/ring
- 1.56 Hz



LW, Cavity Compton

Damping Ring
ultra low emittance beam
dynamics -fast ion instability
beam instrumention(BPM,LW)

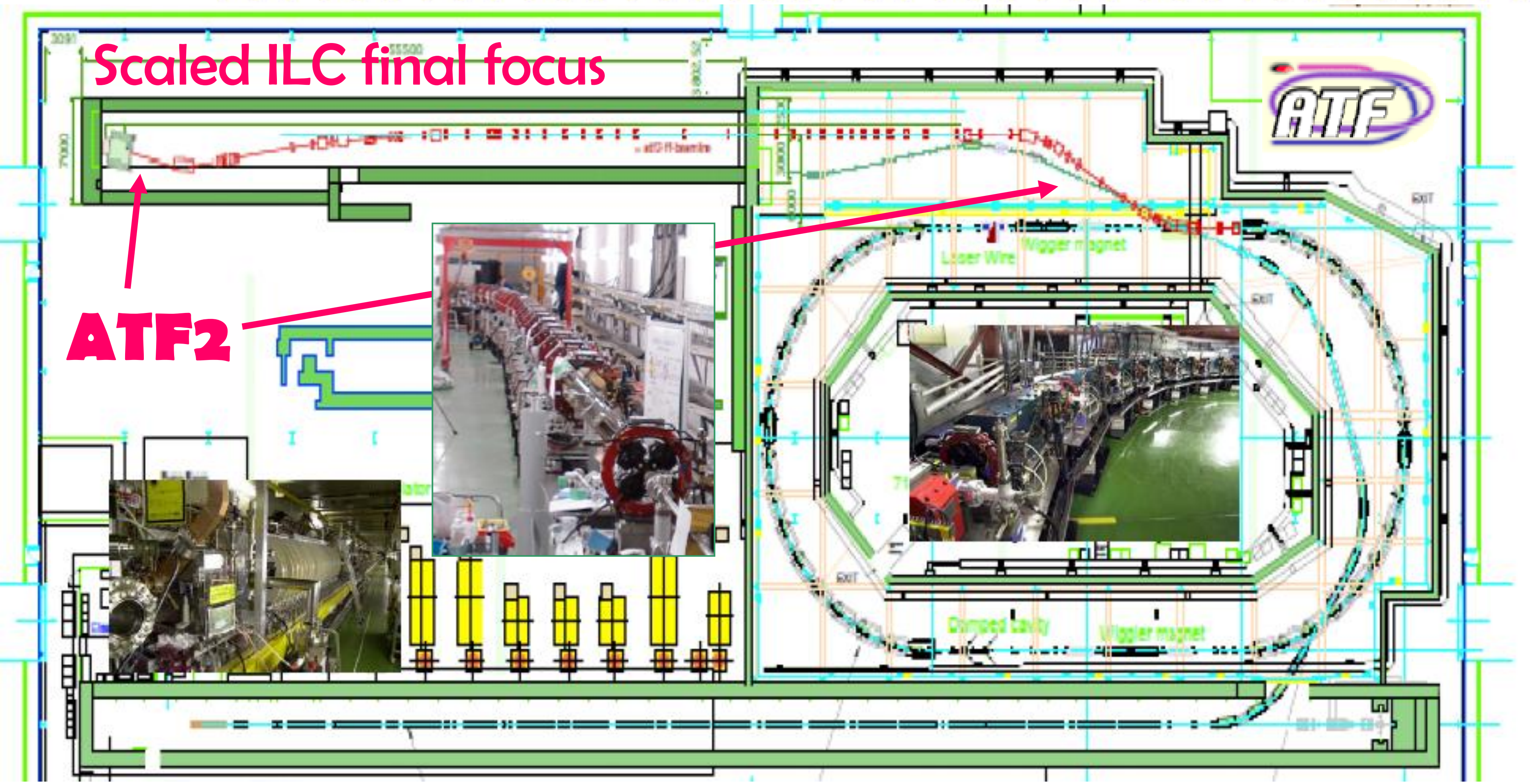
Fast kicker
rise time < 3ns

RF Gun
multi-bunch beam

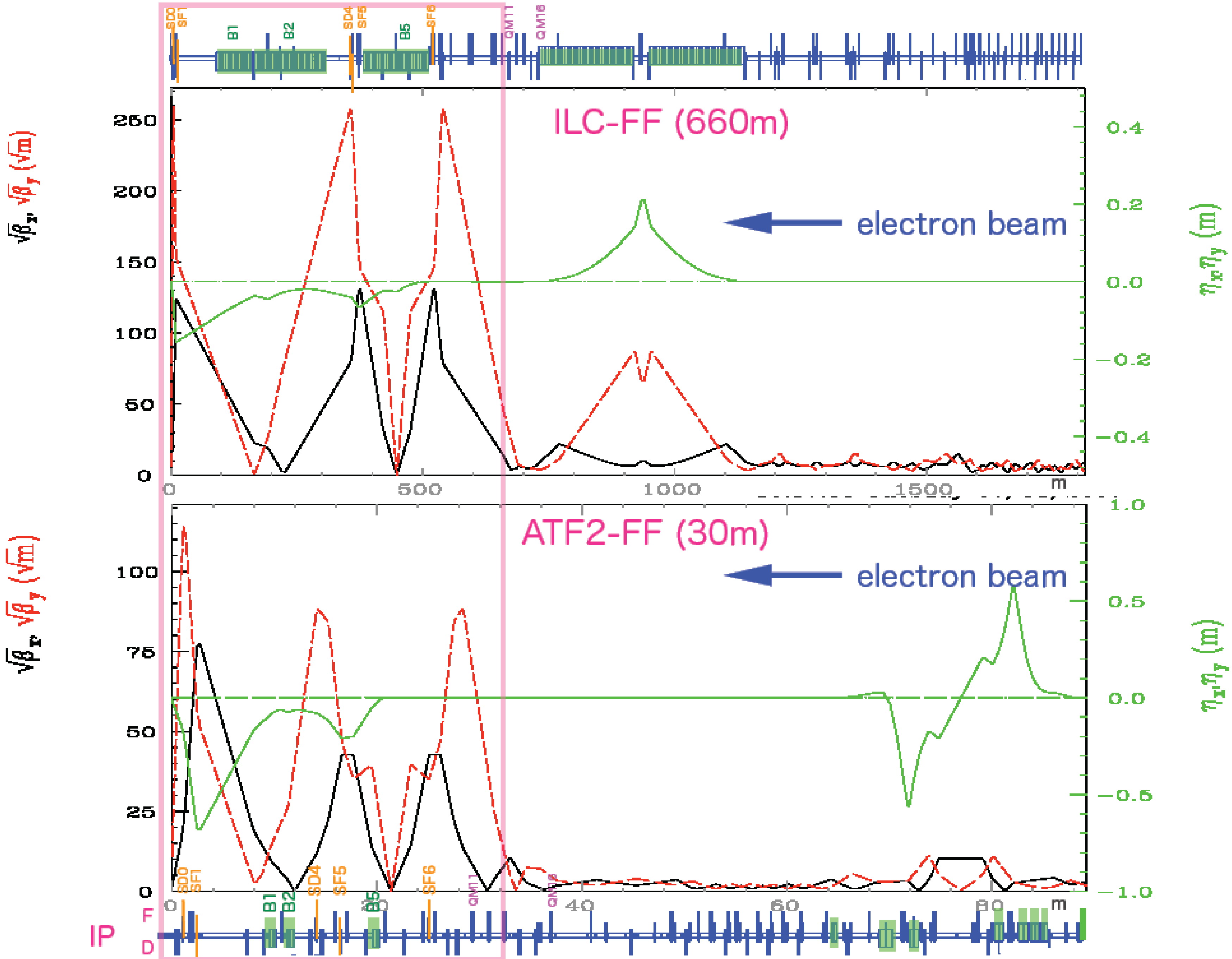
S-band Linac (70m)
multi-bunch acceleration

ATF2: model of ILC beam delivery

goals: ~37nm beam size; nm level beam stability



- Dec 2008: first pilot run; Jan 2009: hardware commissioning
- Feb-Apr 2009: large β; BSM laser wire mode; tuning tools commissioning
- Oct-Dec 2009: commission interferometer mode of BSM & other hardware



ILC-FF (660m)
electron beam
ATF2-FF (30m)
electron beam
IP
F
D

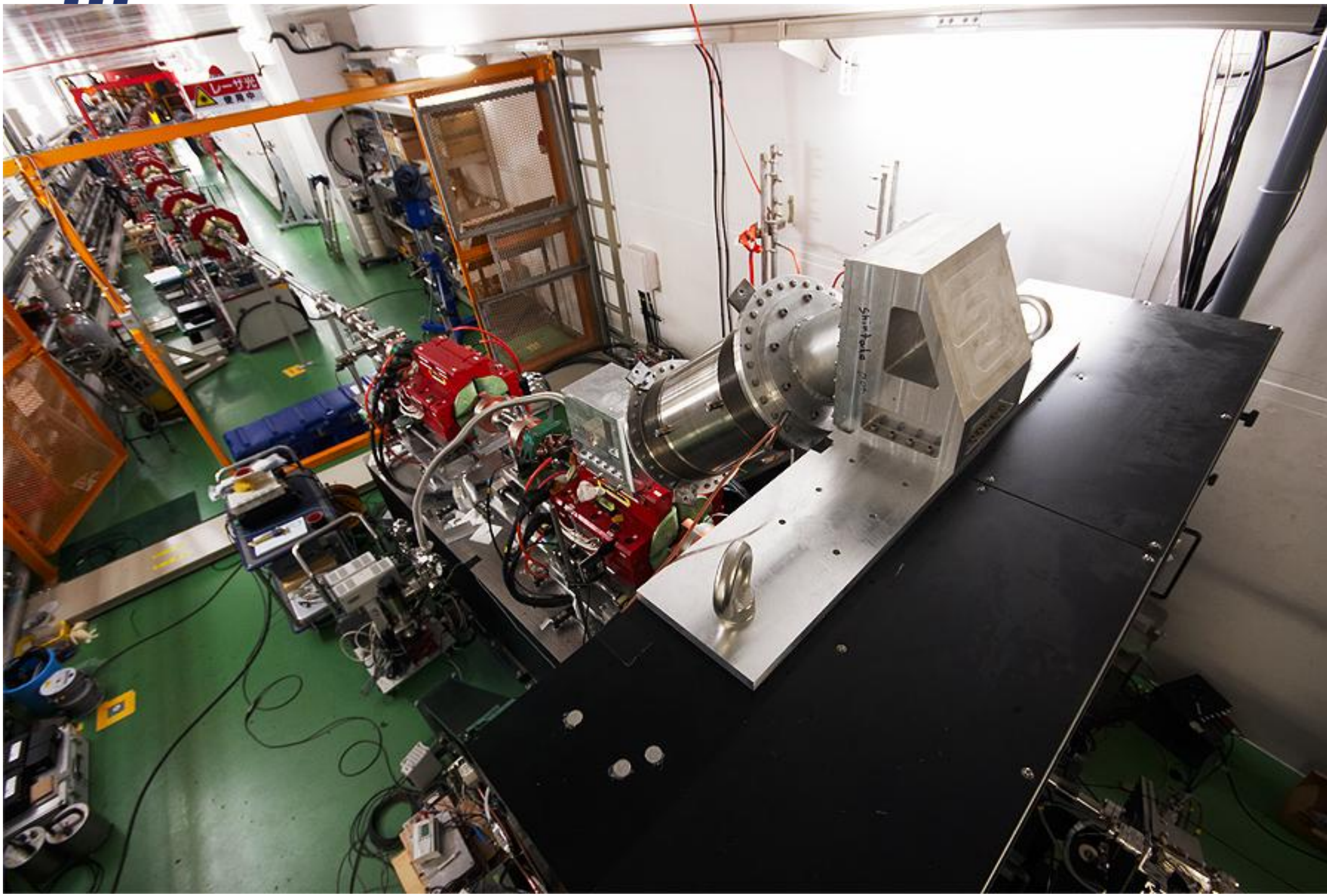
ATF2 parameters & Goals A/B

Beam parameters achieved at ATF and planned for ATF2, goals A and B. The ring energy is E0 = 1.3 GeV, the typical bunch length and energy spread are σ_z =8 mm and ΔE/E = 0.08 %.

	Measured	(A)	(B)
Single Bunch			
N_{bunch} $[10^{10}]$	0.2 – 1.0	0.5	0.5
DR $\gamma\varepsilon_y$ $[10^{-8}\text{m}]$	1.5	3	3
Extr. $\gamma\varepsilon_y$ $[10^{-8}\text{m}]$	3.0 – 6.5	3	3
Multi Bunch			
$n_{bunches}$	20	1 – 20	3 – 20
N_{bunch} $[10^{10}]$	0.3 – 0.5	0.5	0.5
DR $\gamma\varepsilon_y$ $[10^{-8}\text{m}]$	3.0 – 4.5	3	3
Extr. $\gamma\varepsilon_y$ $[10^{-8}\text{m}]$	~ 6	3	3
IP σ_y^* [nm]		37	37
IP $\Delta y/\sigma_y^*$ [%]		30	5

ATF2 proposed IP parameters compared with ILC

Parameters	ATF2	ILC
Beam Energy [GeV]	1.3	250
L^* [m]	1	3.5 – 4.2
$\gamma\,\epsilon_x$ [m-rad]	3×10^{-6}	1×10^{-5}
$\gamma\,\epsilon_y$ [m-rad]	3×10^{-8}	4×10^{-8}
β_x^* [mm]	4.0	21
β_y^* [mm]	0.1	0.4
η' (DDX) [rad]	0.14	0.094
σ_E [%]	~0.1	~0.1
Chromaticity W_y	$\sim 10^4$	$\sim 10^4$


レーザ光
使用中

Magnets and Instrumentation at ATF2

22 Quadrupoles(Q), 5 Sextupoles(S), 3 Bends(B) in downstream of QM16

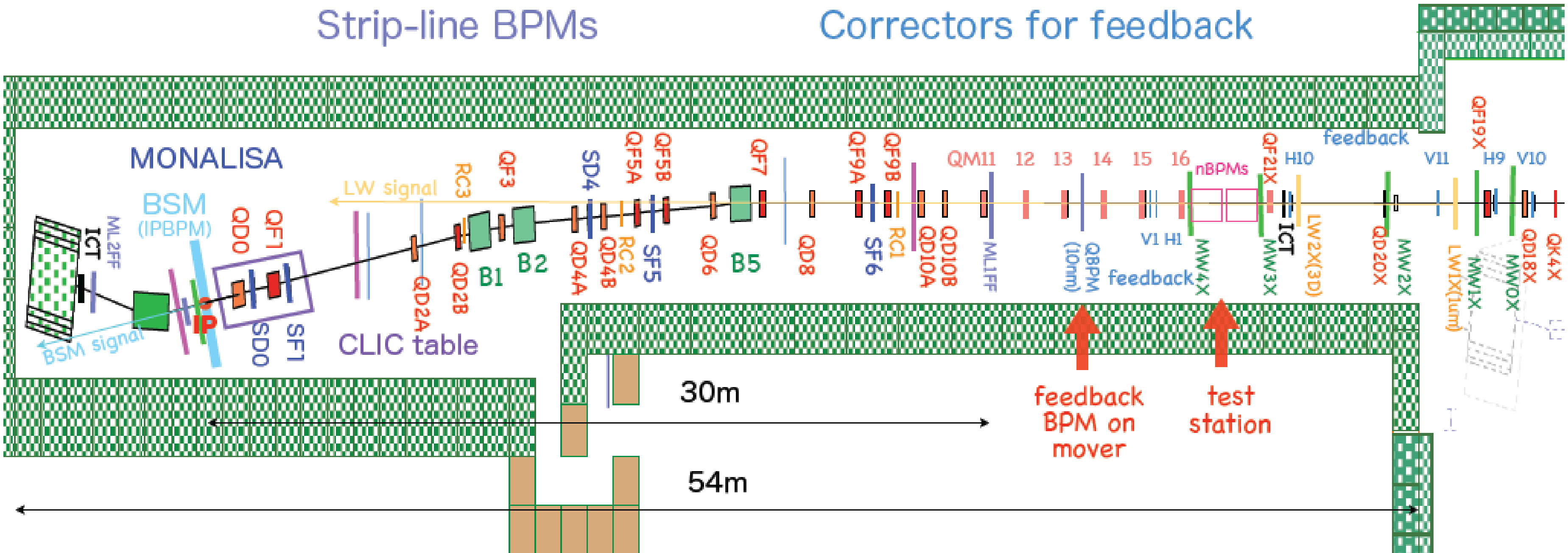
All Q- and S-magnets have cavity-type beam position monitors(QBPM, 100nm).

3 Screen Monitors

5 Wire Scanners, Laserwires

Strip-line BPMs

Correctors for feedback



Shintake Monitor (beam size monitor, BSM with laser interferometer)

MONALISA (nanometer alignment monitor with laser interferometer)

Laserwire (beam size monitor with laser beam for 1 μm beam size, 3 axies)

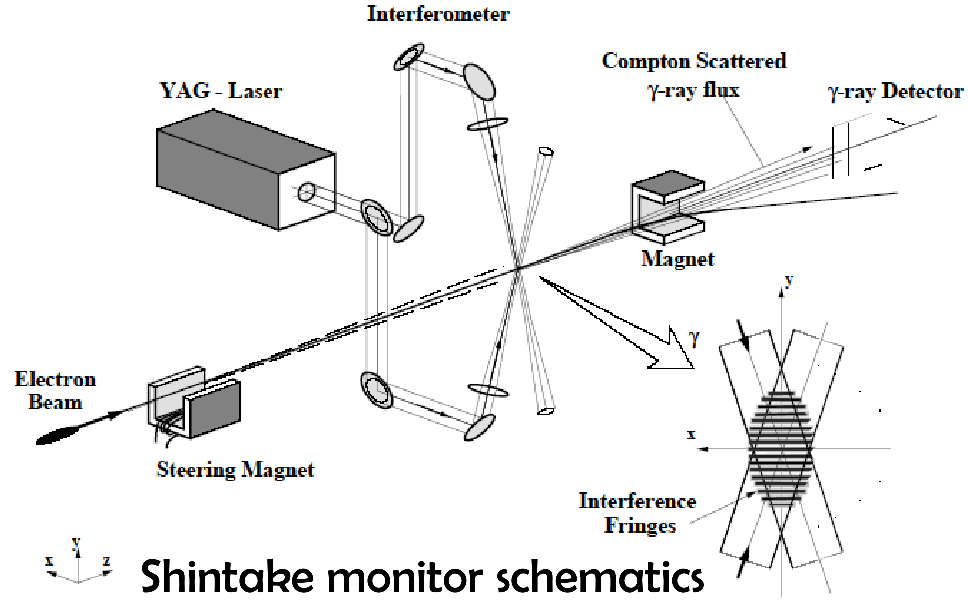
IP intra-train feedback system with latency of less than 150ns (FONT)

Magnet movers for Beam Based Alignment (BBA)

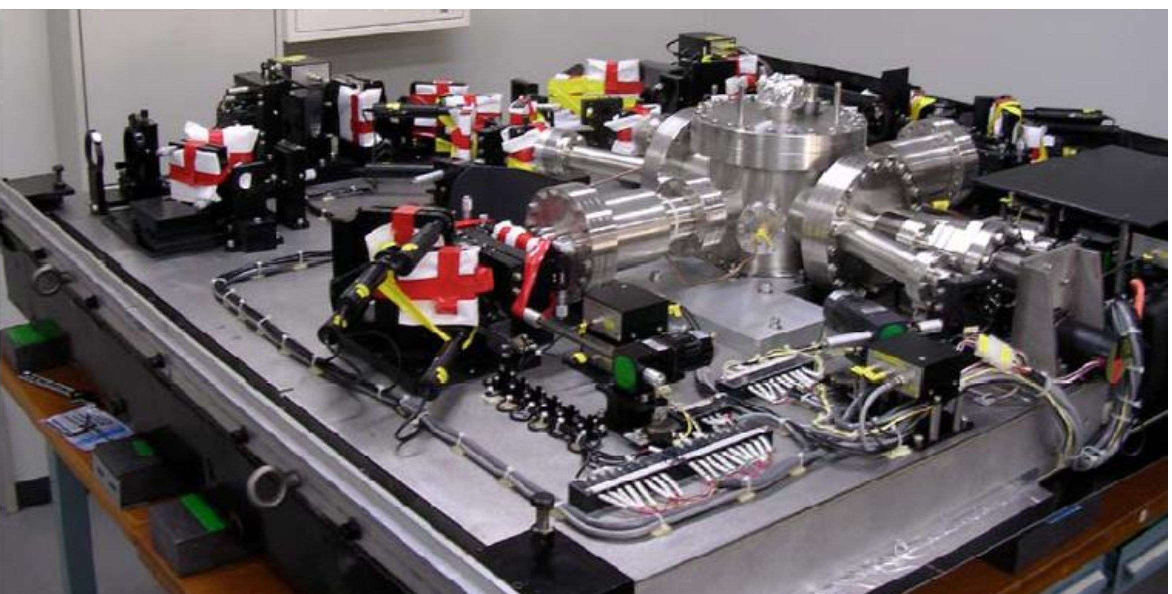
High Available Power Supply (HA-PS) system for magnets

IP Beam Size monitor

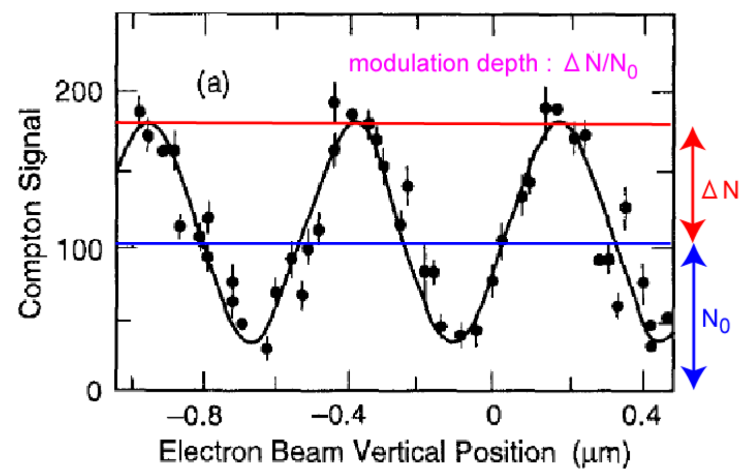
- BSM:
  - refurbished & much improved FFTB Shintake BSM
  - 1064nm=>532nm



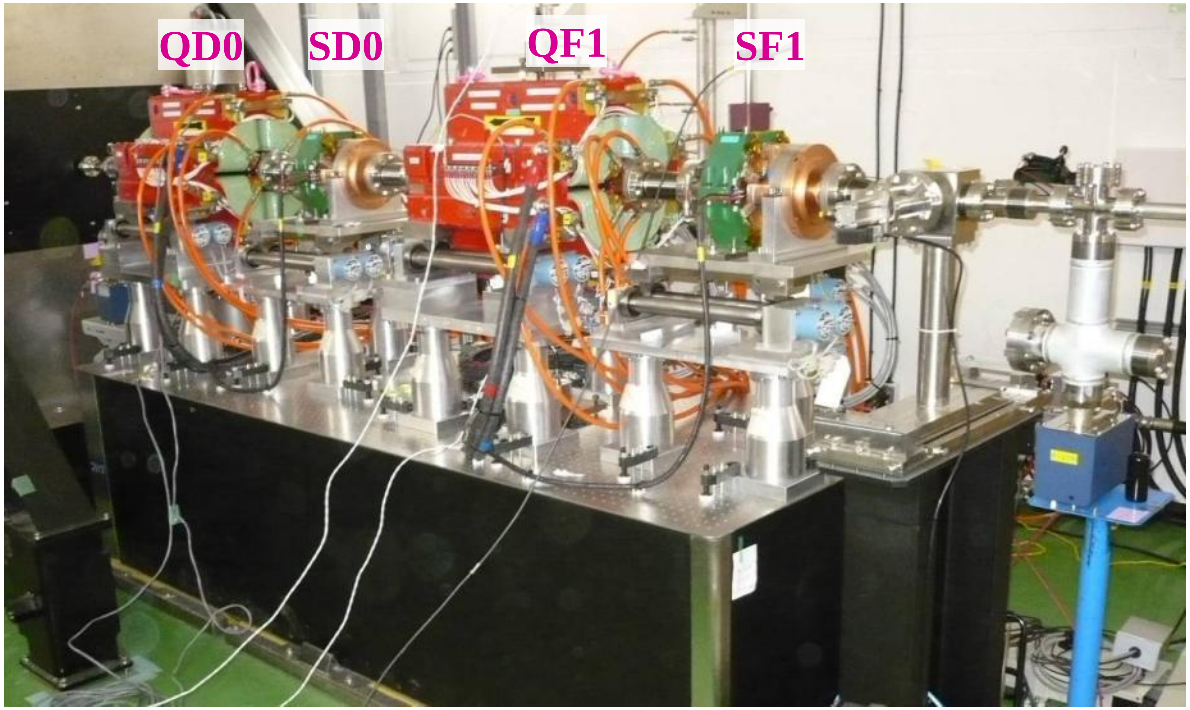
Shintake monitor schematics



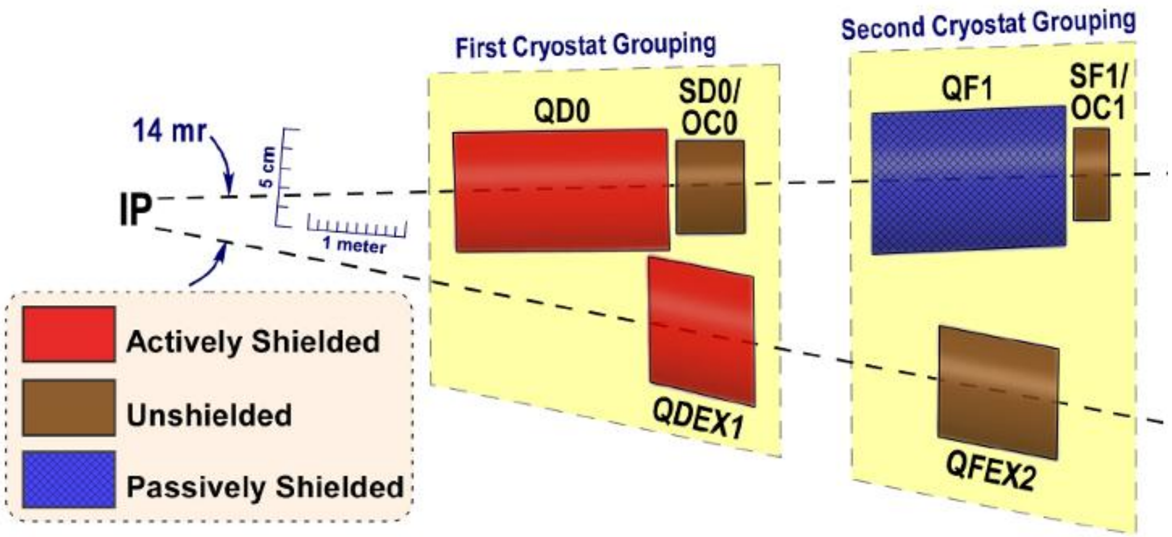
Jul 2005: BSM after it arrived to Univ. of Tokyo



FFTB sample : σ_y = 70 nm



ATF2 final doublet



ILC Final Doublet layout

Ongoing R&Ds at ATF/ATF2

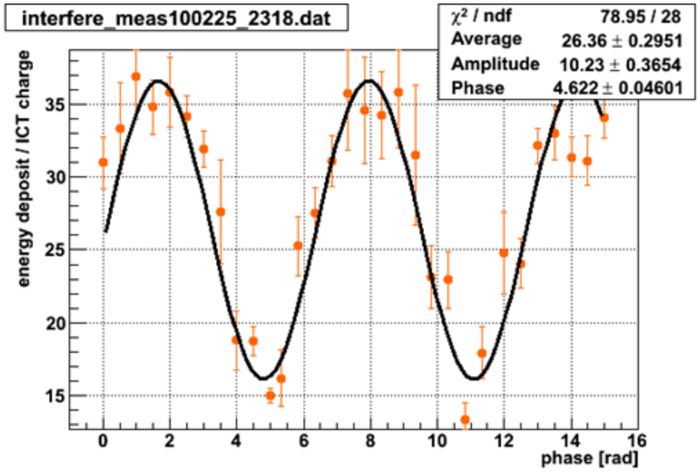
- **ATF**
- **low emittance beam**
  - Tuning, XSR, SR, Laser wire,…
- **1pm emittance** (DR BPM upgrade,.
- **Multi-bunch**
  - Instability (Fast Ion,…)

  Extraction by Fast Kicker

Others

  - Cavity Compton
  - SR monitor at EXT

Interfere mode scan



Beam size ~ 2.4 μm
Wire scanner measurement ~ 3.1 μm

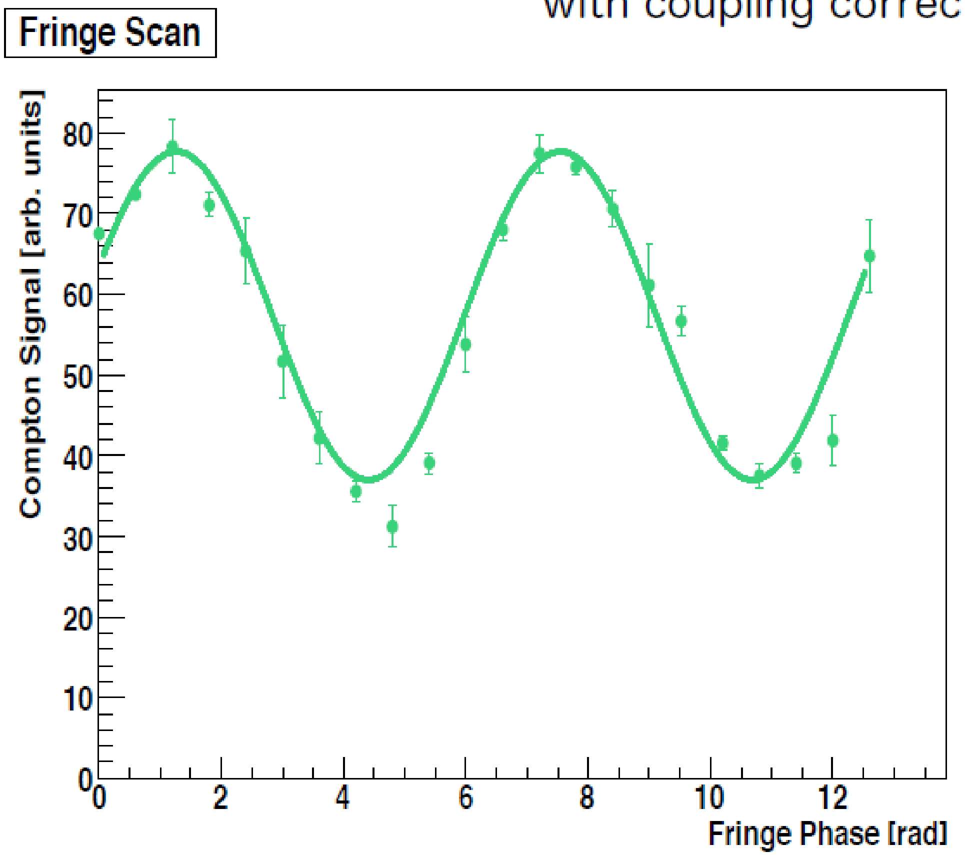
- **ATF2**
- **35 nm beam size**
  - Beam tuning (Optics modeling, Optics test, debugging soft&hard tools,…)
  - Cavity BPM (C&S-band, IP-BPM)
  - Beam-tilt monitor
  - IP-BSM (Shintake monitor)
- **Beam position stabilization (2nm)**
  - Intra-train feedback (FONT)
  - feed-forward DR->ATF2

Others

- Pulsed 1um Laser Wire
- Cold BPM
- Liquid Pb target
- **Permanent FD Q**
- **SC Final doublet Q/Sx**

Fringe Scan Results (2 degree mode)

with coupling correction at PIP by QK1-4X (rough)

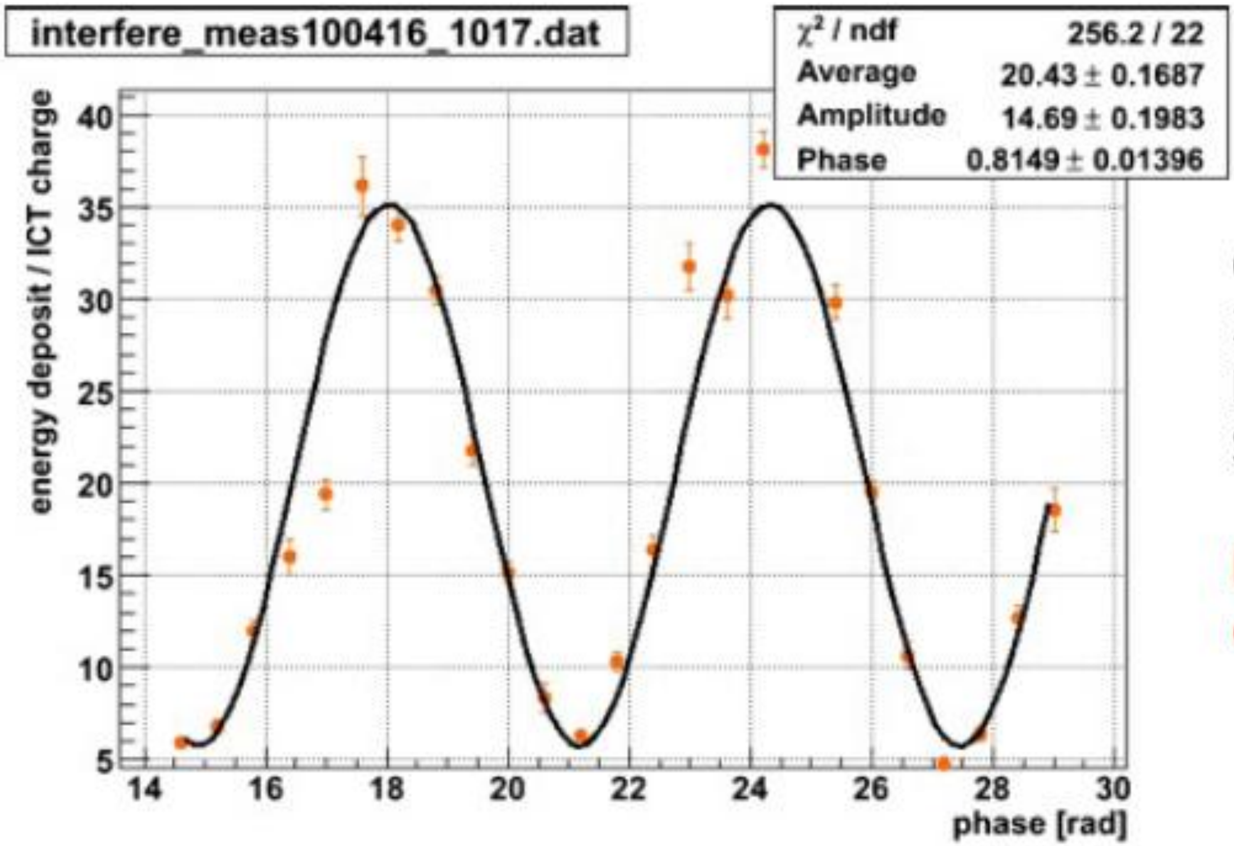


Crossing angle : 2.29 [deg]
Average of 4 bunches/point
Scan range 13.2[rad]
with a step of 600mrad

Fringe Pitch 13.3 um

Modulation = 0.35±0.01
σy = 3.1± 0.03 um
QD0 current at 129 A

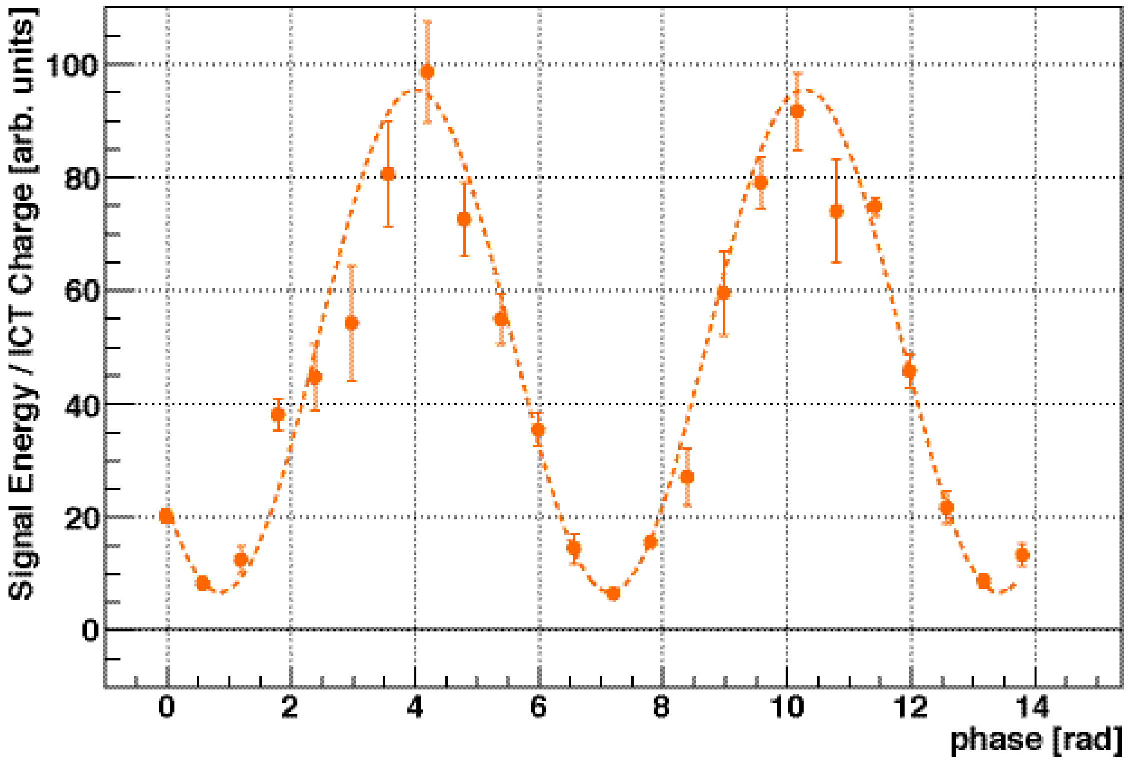
as expected from the PIP beam size measurements !



Crossing angle :4.12 [deg]
20 average
Fringe pitch 600 mrad
Scan range 13.2[rad]

Modulation ~ 0.72
σ_y ~ 950[nm]

Best result of continuous tune week: May 17-21, 2010



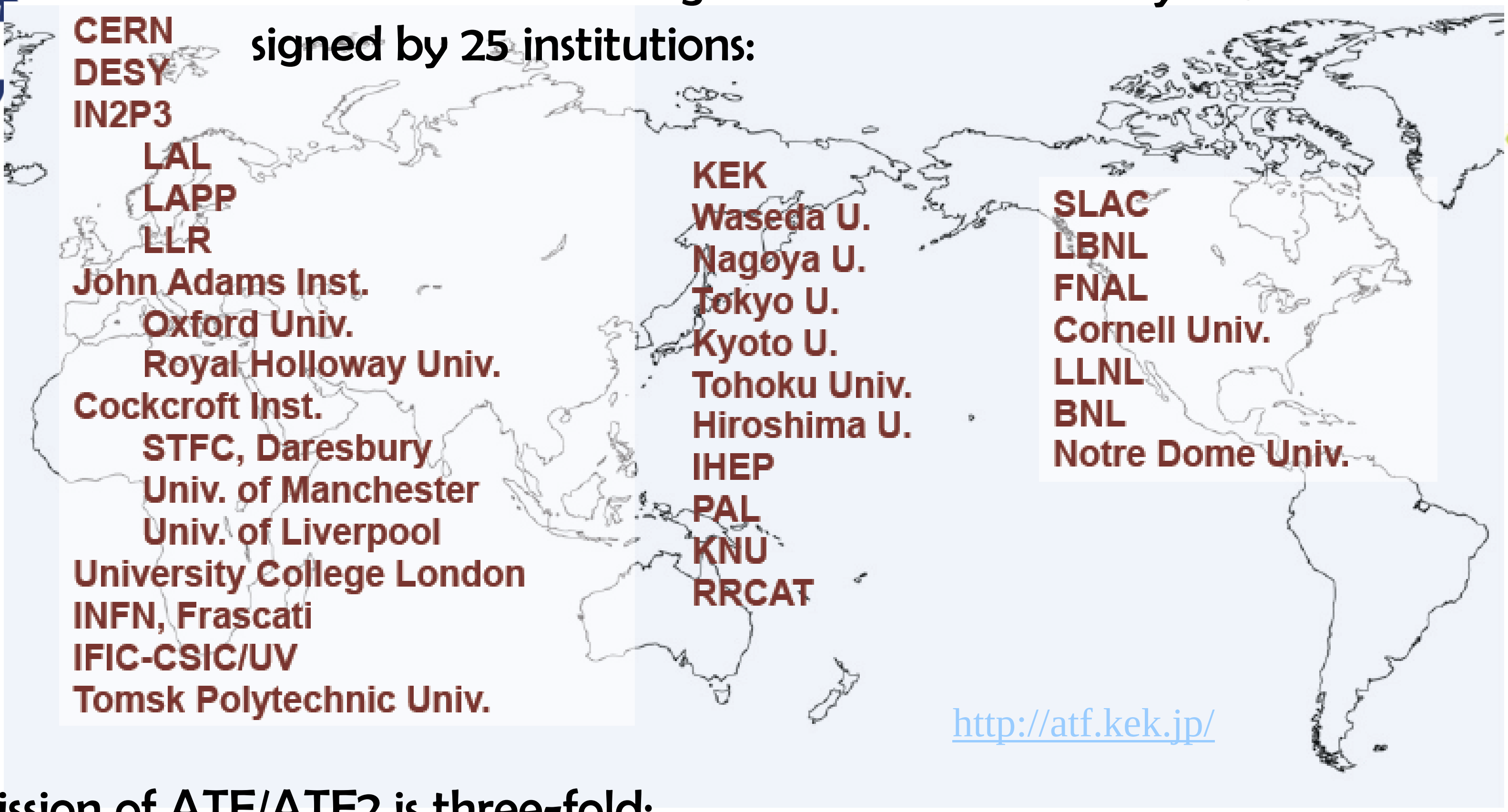
Yoshio Kamiya and Shintake monitor group.
Modulation Depth = 0.87 @ 8.0 deg. mode
Beam Size is 310 +- 30 (stat.) +0-40 (syst.) nm

[atf2-commissioning 380] ATF2 continuous operations week

- We completed our first 1 week "continuous operations run" of ATF2 tuning, May 17 - May 21. During the run we reached a minimum IP vertical spot size of about 300nm. The run was a successful integration of tuning tasks tested in past shifts and has provided a lot of information on how to move forward from here. Below is a brief bullet-point summary of events during the week, more detail can be found on the wiki (http://atf.kek.jp/collab/md/atfwiki/?Scheduling%2F2010May17May21).
- DR tuning (ey ~10pm)
- 10* IP beta_x/beta_y optics loaded for EXT+FFS (4cm/1mm)
- Magnets standardised
- EXT dispersion correction
- EXT ey measured at ~11pm, no coupling correction required
- Cavity BPM systems calibrated
- Beam size brought to ~normal in x <2um in y at IP with W and C wirescanners (some wirescanners cut during scanning)
  - x and y waists brought to IP with alpha knobs
  - y beta function looks correct to within ~20% from PIP measurements with waist at IP
- vertical beam size acquired with IPBSM, starting size ~850nm
- Beam size reduced to 300nm with sextupole waist, coupling, dispersion multiknobs, qd0 current and roll scans.
- Beam size verified in 30-degree and 8-degree IPBSM modes.
- Could not scan with 30-degree mode as could not resolve larger size beam
- Attempted IP beta reduction to 0.5mm, but could not re-acquire beam
- Switch back to 8-degree mode, restore optics and tune back to ~350nm (reproducibility!)

Glen White (SLAC), on behalf ATF2 commissioning team.

ATF International organization is defined by MOU signed by 25 institutions:



CERN
DESY
IN2P3
- LAL
- LAPP
- LLR

John Adams Inst.
- Oxford Univ.
- Royal Holloway Univ.

Cockcroft Inst.
- STFC, Daresbury
- Univ. of Manchester
- Univ. of Liverpool

University College London
INFN, Frascati
IFIC-CSIC/UV
Tomsk Polytechnic Univ.

KEK
Waseda U.
Nagoya U.
Tokyo U.
Kyoto U.
Tohoku Univ.
Hiroshima U.
IHEP
PAL
KNU
RRCAT

SLAC
LBNL
FNAL
Cornell Univ.
LLNL
BNL
Notre Dome Univ.

http://atf.kek.jp/

MOU: Mission of ATF/ATF2 is three-fold:

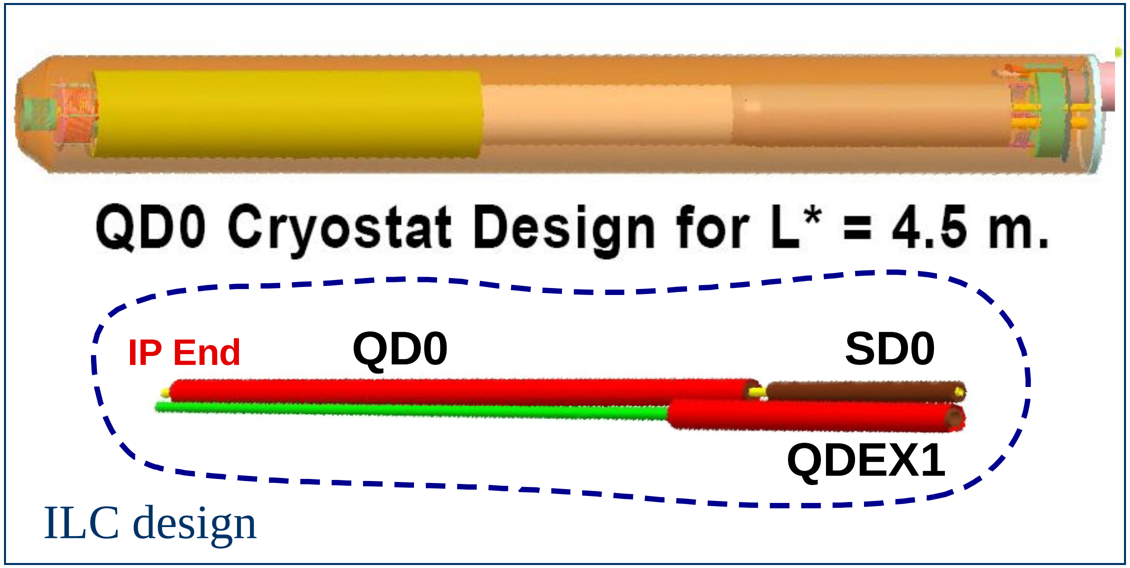
- ATF, to establish the technologies associated with producing the electron beams with the quality required for ILC and provide such beams to ATF2 in a stable and reliable manner.
- ATF2, to use the beams extracted from ATF at a test final focus beamline which is similar to what is envisaged at ILC. The goal is to demonstrate the beam focusing technologies that are consistent with ILC requirements. For this purpose, ATF2 aims to focus the beam down to a few tens of nm (rms) with a beam centroid stability within a few nm for a prolonged period of time.
- Both the ATF and ATF2, to serve the mission of providing the young scientists and engineers with training opportunities of participating in R&D programs for advanced accelerator technologies.

Ph.D. thesis at ATF2 (as of May 2010)

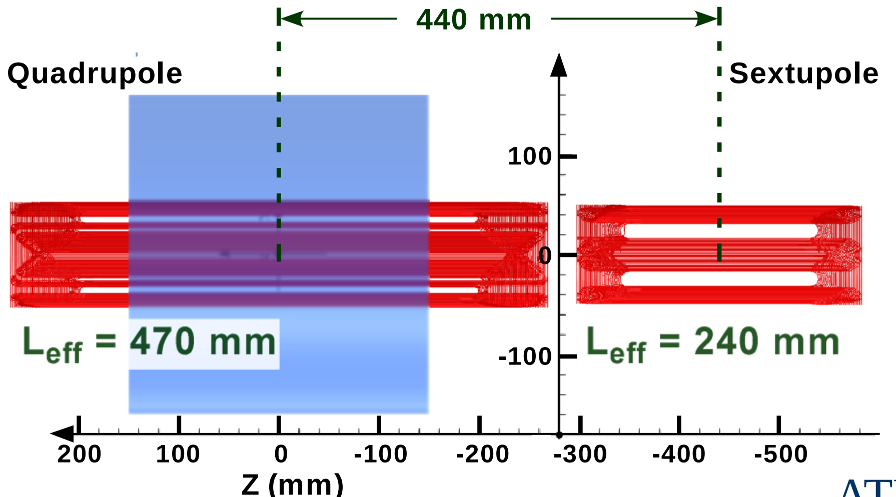
Year	university	country	Name	title
2007.11.12	Université de Savoie	France	Benoit Bolson	Etude des vibrations et de la stabilisation a l'echelle sous-nanometrique des doublets finaux d'un collisionneur lineaire
2007.12.21	University of Tokyo	Japan	Taikan Suehara	Development of a Nanometer Beam Size Monitor for ILC/ATF2
2009.4.14	Royal Holloway, University of London	UK	Lawrence Deacon	A Micron-Scale Laser-Based Beam Profile Monitor for the International Linear Collider
2010.6.8	UNIVERSITAT DE VALÈNCIA	Spain	María del Carmen Alabau Pons	Optics Studies and Performance Optimization for a Future Linear Collider: Final Focus System for the e-e- Option (ILC) and Damping Ring Extraction Line (ATF)
2010.5.8	IHEP CAS	China	Sha Bai	ATF2 Optics System Optimization and Experiment Study
2010.6.11	Université Paris-Sud 11	France	Yves Renier	Implementation and Validation of the Linear Collider Final Focus Prototype ATF2 at KEK (Japan)
	Oxford university	UK		FONT studies
2011.12.1	University of Tokyo	Japan	Masahiro Oroku	Beam Tuning with the Nanometer Beam Size Monitor at ATF2
2011.12.1	Kyungpook National University	Korea	Youngim Kim	IPBPM and BBA
2011.12.1	University of Manchester	UK	Anthony Scarfe	Tuning and alignment of ATF2 and ILC
2012.2.xx	University of Tohoku	Japan	Taisuke Okamoto	cavity-type tilt monitor of beam orbit for ILC
2012.12.1	Kyungpook National University	Korea	Siwon Jang	IPBPM and BBA
2012.12.1	CERN	Spain	Eduardo Marin Lacoma	Ultra Low Beta Optics
	Oxford university	UK		FONT studies
	ICIF, Valencia university	Spain	Javier Alabau-Gonzalvo	emittance, coupling measuremwnts with multiple OTR system

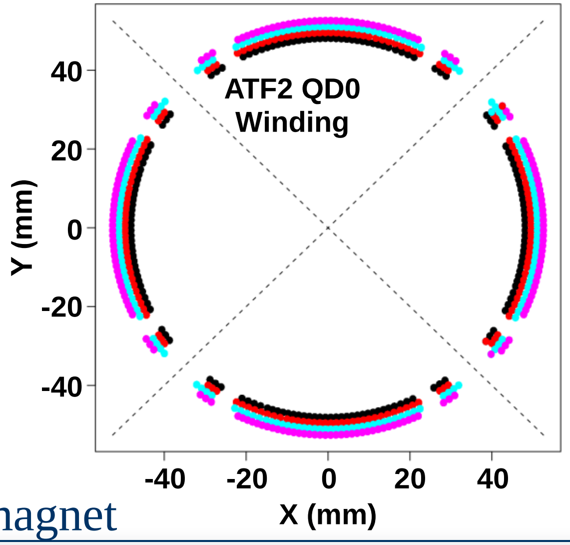
SC Final Doublet and ATF2 tests

- SC FD prototype at BNL
  - make long coil test of ILC-like FD prototype
  - ILC-technology-like SC Final Doublet for ATF2 upgrade
  - Will test FD SC stability at BNL and system test with beam at ATF2



Brett Parket, at al, BNL





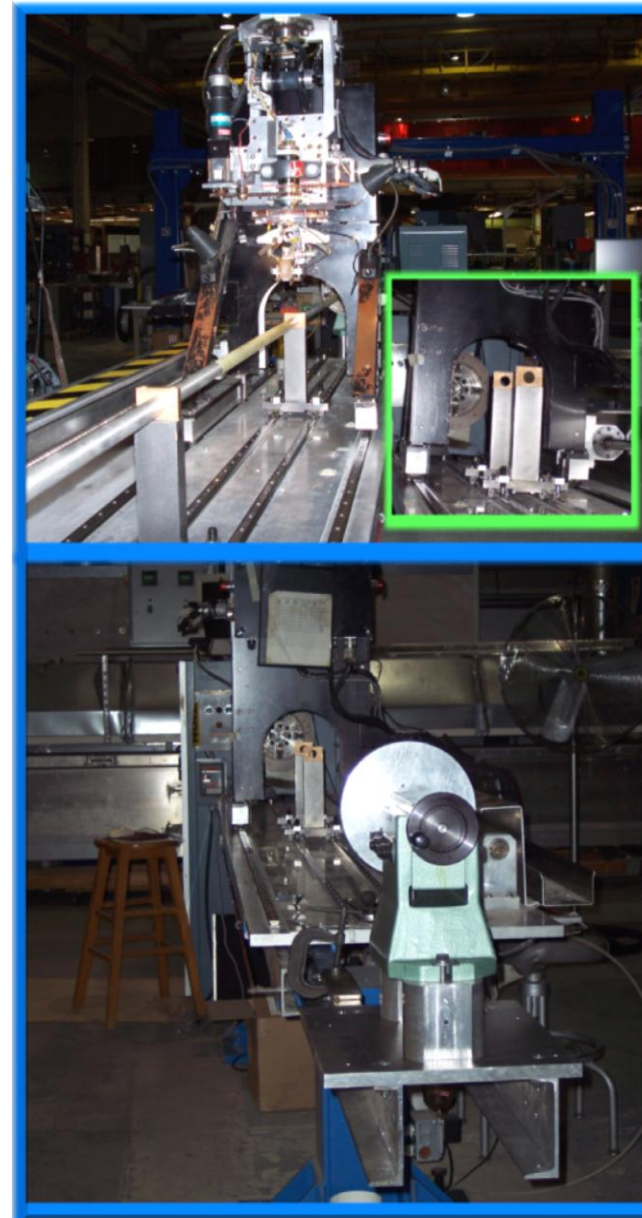
ATF2 Q/S magnet

ILC QD0 R&D Prototype

Long Coil Winding Challenges

- We did not adequately control the coil support tube position (even with orthogonal machine-controlled rolling supports). Our first R&D coils had substantial harmonic errors.
- We have therefore decided to go back to using a few fixed, rigid supports and have made modifications (shown here) to the ATF2 short coil winding machine.

- We extended the machine & carefully positioned fixed supports between the coils.
- The 2.2 m long QD0 R&D coil will be wound in two sections on a common tube.



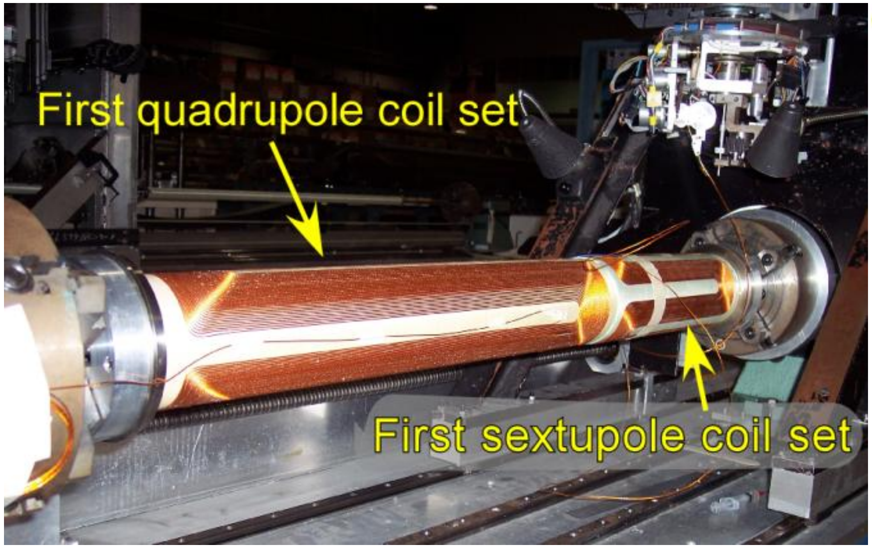
“ILC SC FD & ATF2 SC Magnet Upgrade – Update,” Brett Parker, BNL-SMD

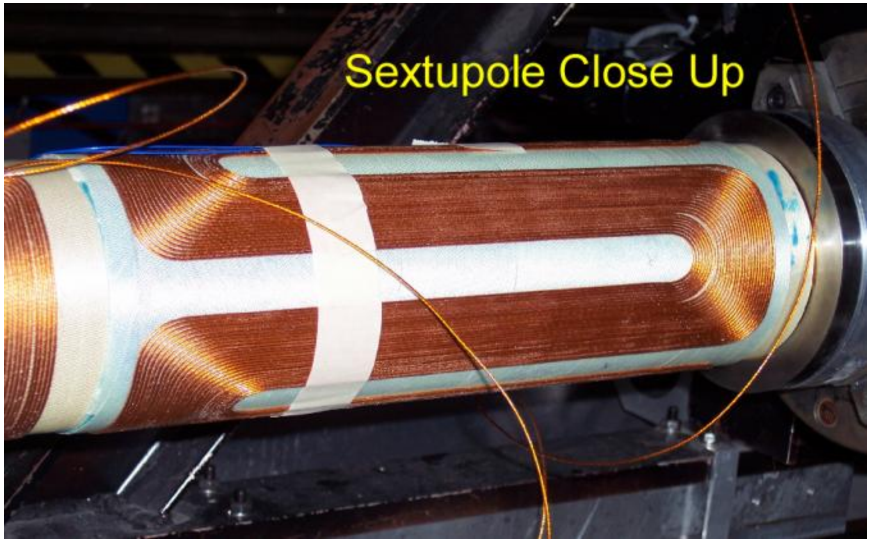
ILC SC FD prototype (June 2010)

- ILC R&D full length prototype the new winding setup with stationary intermediate supports have performed well during winding of the two halves of the QD0 coil. The tube position stable. The coils have received their compression wraps.
- After the curing oven the magnetic measurements will be done. Interpretation of the field harmonics will show how well the new winding support scheme worked for positioning the coil.
- Parts orders are going out for the Service Cryostat (heat exchanger, major valves etc.) and magnet cryostat.

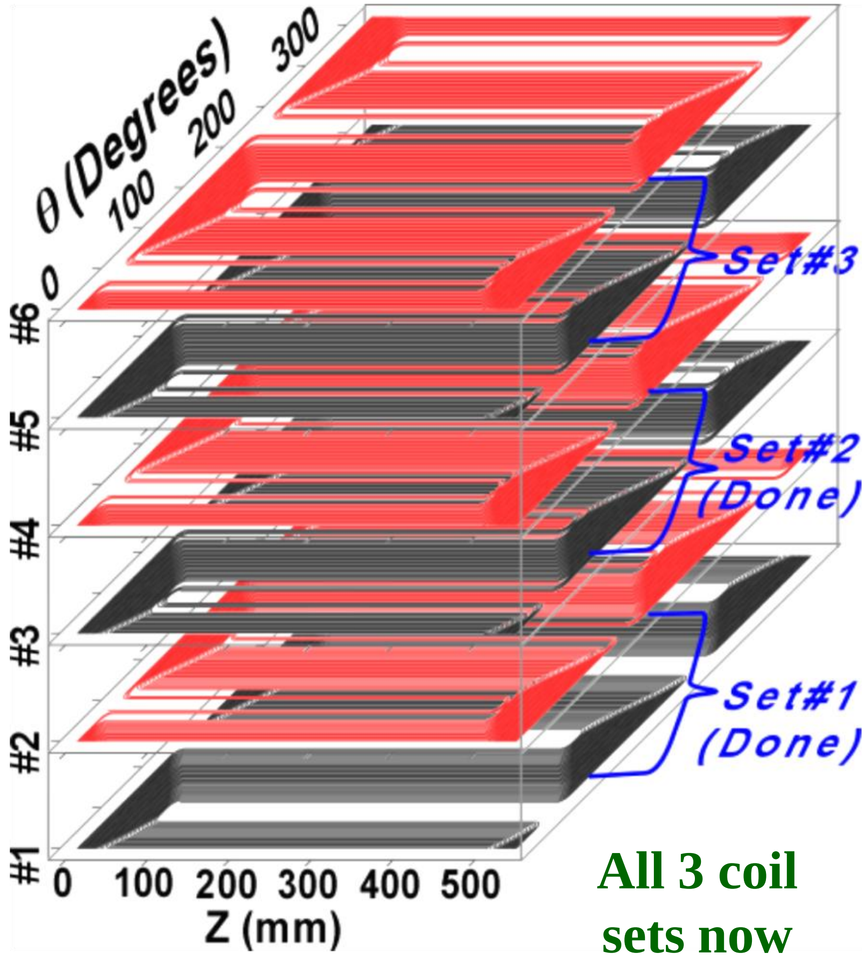
BNL engineer setting up the compression wrap tooling. The quadrupole away from the IP is partially wrapped, the IP-side coil is not wrapped and there is only bare Kapton covering the area where the sextupole package will go.

ATF2 Coil Winding Status





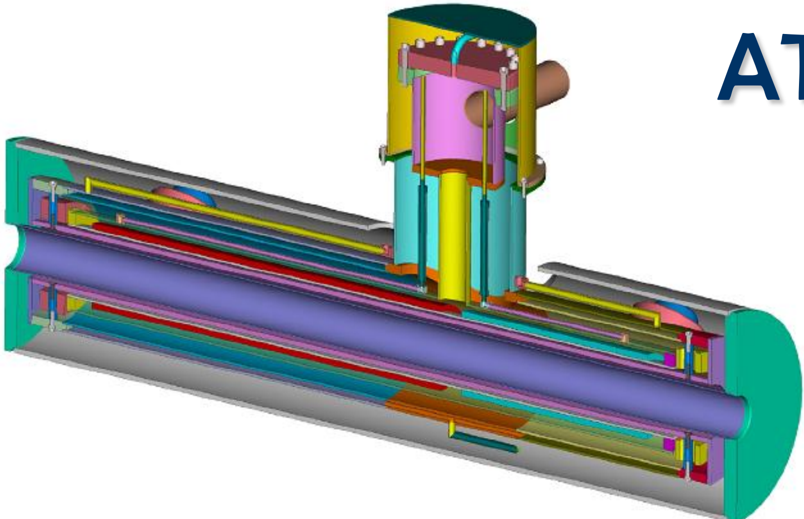
Winding Schematic for ATF2 Quad

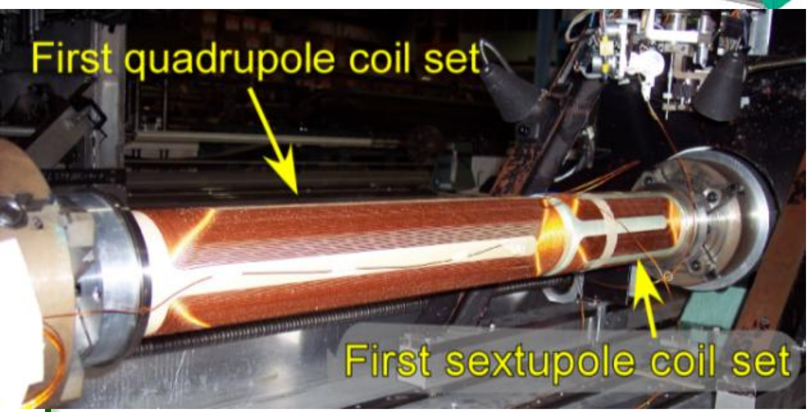


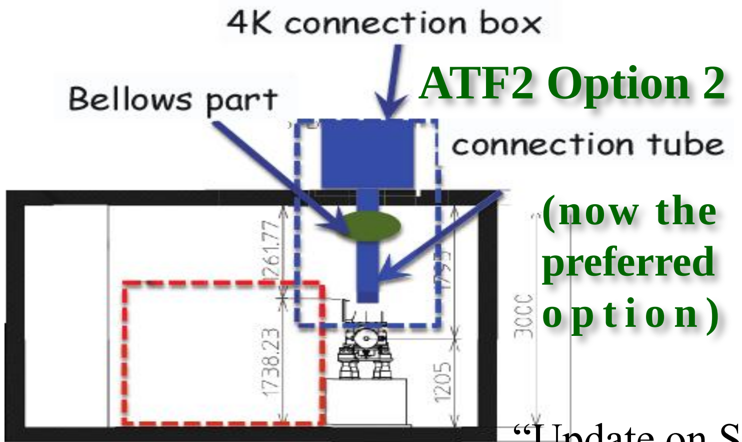
All 3 coil sets now complete

"Update on ATF2 SC Magnets"
Brett Parker, BNL-SMD

ATF2 SC FD and Cryogenics







ATF2 SC FD face-to-face meeting at BNL

Tuesday 24 November 2009 from 08:00 to 18:00 US/Eastern
at BNL, USA (*902A Conference Room 63*)
support: parker@bnl.gov

Material: **meeting at BNL**

Tuesday 24 November 2009 top

08:00->*09:00* **Setup and Welcome**

Description:
1) Time for preparation before start of meeting
2) Welcome and Introductions

09:00->*12:00* **Morning Session**

09:00	ATF2 Superconducting Upgrade Introduction & Overview (30') (Slides) 1) Review work that has already been done. 2) Discuss work needed for the next ATF2 TB review 3) Discuss plan for today's meeting	Brett Parker
09:30	Status of the KEK Cryogenic Design (30') (Slides)	Nobuhiro Kimura and Takayuki Tomaru
10:00	Review and Discussion of the BNL Mechanical Design (1h00') (Slides) Short presentation plus viewing of CAD model	Andy Marone and Henry Hocker
11:00	Discussion of Laser Access Ports (30')	Brett Parker (David Urner and Paul Coe via webex)
11:30	Discussion of Supports/Stabilization Structure (30') (Slides)	Brett Parker (Andrea Jeremie and Benoit Bolzon via webex)

Face-to-face meeting at BNL was very productive; Has schedules a next meeting at Annecy

“Update on SC Magnets and Schedule,” 83
Brett Parker, BNL-SMD

ATF2 SC FF meeting next week


FRANCE-JAPAN PARTICLE PHYSICS

TOSHIKO YUASA LAB.

Workshop FJPPL'10

15-17 June 2010 | LAPP, Annecy-Le-Vieux (France)

- Overview
- Timetable
- Registration
- Registration Form
- List of registrants
- Practical info about Annecy
- How to reach to LAPP
- Accommodation
- FJPPL Twiki

- ATF2 SC FF satellite meeting

support

Home

The Toshiko Yuasa Laboratory (TYL) or France Japan Particle Physics laboratory (FJPPL) is organising here its 4th workshop. TYL (FJPPL) is a joint Laboratory (LIA) supported by IN2P3/CNRS, IRFU/DSM/CEA and KEK. Previous FJPPL workshops contributions are available here: **FJPPL'09**, **FJPPL'08**, **FJPPL'07**, All currently supported programs and new proposals will be presented at this workshop.

* FJPPL Workshop: Tue. June 15 -- Wed.. June 16 2010
* Banquet: Wed.. June 16 (Evening) 2010
* FJPP LIA Steering committee: Thur. June 17 (Morning) 2010
* KEK-IN2P3-IRFU Directorate Meeting: Thur. June 17 (Afternoon) 2010

Dates: from 15 June 2010 08:30 to 17 June 2010 23:30

Location: *LAPP, Annecy-Le-Vieux (France)*
Room: Petit Amphi

Chairs: Prof. Takasaki, Fumihiko
Dr. Perret-Gallix, Denis

http://indico.in2p3.fr/conferenceDisplay.py?confId=2938 http://ilcagenda.linearcollider.org/conferenceDisplay.py?confId=4562

"SC FF meeting"

chaired by Andrea Jeremie (LAPP) , Andrei Seryi (SLAC) , Toshiaki Tauchi (KEK) , Philip Bambade (Laboratoire de l''Accelerateur Lineaire (LAL) (IN2P3) (LAL))

Monday 14 June 2010
from **08:00** to **18:00**
at LAPP (***Salle des Sommets***)
support: Andrea.Jeremie@lapp.in2p3.fr

09:00->*10:00* **Introduction and Topics from ATF2** (Convener: Toshiaki Tauchi (*KEK*) , Andrei Seryi (*SLAC*))

09:00	Introduction and ATF2 overview (20')		Andrea Jeremie (*LAPP*)
09:20	Recent results of the ATF2 continuous run (40')		Philip Bambade (*Laboratoire de l''Accelerateur Lineaire (LAL) (IN2P3) (LAL)*)

10:30->*12:30* **Possible Synergy with Super B factories** (Convener: Philip Bambade (*Laboratoire de l''Accelerateur Lineaire (LAL) (IN2P3) (LAL)*))

10:30	SC-FD at ATF2 (30')	Brett Parker (*BNL*)
11:00	SC-FD at Super KEKB (20')	Norihito Ohuchi (*KEK*)
11:20	IR stability at SuperKEKB (20')	Hiroshi Yamaoka (*KEK*)
11:40	SC-FD at Frascati Super B project (30')	Eugenio Paoloni (*INFN*) , Simona Bettoni (*CERN*)
12:10	Discussion (20') possibility of synergy, collaboration	

14:00->*15:00* **Cryogenics System a ATF2** (Convener: Brett Parker (*BNL*))

14:00	KEK Status of cryogenics system at ATF2 (30')	Nobuhiro KIMURA (*Cryogenics Science Center / KEK*)
14:30	Reaction from BNL (30') also magnetic field center measurement at BNL	Andy Marone (*BNL*) , Animesh Jain (*BNL*)

15:30->*16:10* **Stability**

15:30	Field center stabilty measurments (20')	Animesh Jain (*BNL*)
15:50	Concepts for combining different sensors in final focus stabilisations (20')	David urner (*University of Oxford*) , Armin Reichold (*Oxford University*)

16:10->*17:30* **Research Plan at ATF2** (Convener: Andrei Seryi (*SLAC*) , Toshiaki Tauchi (*KEK*))

16:10	Research Plan at ATF2 especially after 2012 (20') to identify issues to be discussed : remark : both component and integrated tests are needed	Philip Bambade (*Laboratoire de l''Accelerateur Lineaire (LAL) (IN2P3) (LAL)*)
16:30	Ultra beta optics study with the SC-FF, ATF2 (20') uniqueness and important of beam study	Eduardo Marin (*CERN*)
16:50	MDI and FD at CLIC (20') possibility of beam test at ATF2	Lau Gatignon
17:10	Discussion (20')	

SUB-NM BEAM MOTION ANALYSIS USING A STANDARD BPM WITH HIGH RESOLUTION ELECTRONICS

M. Gasior, H. Schmickler, J. Pfingstner, M. Sylte, M. Guinchard, A. Kuzmin, CERN, Geneva
M. Billing, Cornell University, Ithaca, New York
M. Böge, M. Dehler, PSI, Villigen

Abstract

In the Compact Linear Collider (CLIC) project high luminosity will be achieved by generating and preserving ultra low beam emittances. It will require a mechanical stability of the quadrupole magnets down to the level of 1 nm_{rms} for frequencies above 1 Hz throughout the 24 km of linac structures. Studies are presently being undertaken to stabilize each quadrupole by means of an active feedback system based on motion sensors and piezoelectric actuators. Since it will be very difficult to prove the stability of the magnetic field down to that level of precision, an attempt was made to use a synchrotron electron beam as a sensor. The beam motion was observed with a standard button Beam Position Monitor (BPM) equipped with high resolution electronics. Beam experiments were carried out to qualify such a measurement at CesrTA (Cornell University) and at SLS (PSI, Villingen), where the residual motion of the circulating electron beams was measured in the frequency range of 5 – 700 Hz. This paper describes the results achieved along with the equipment used to measure both the residual beam motion and the mechanical vibration of machine elements.

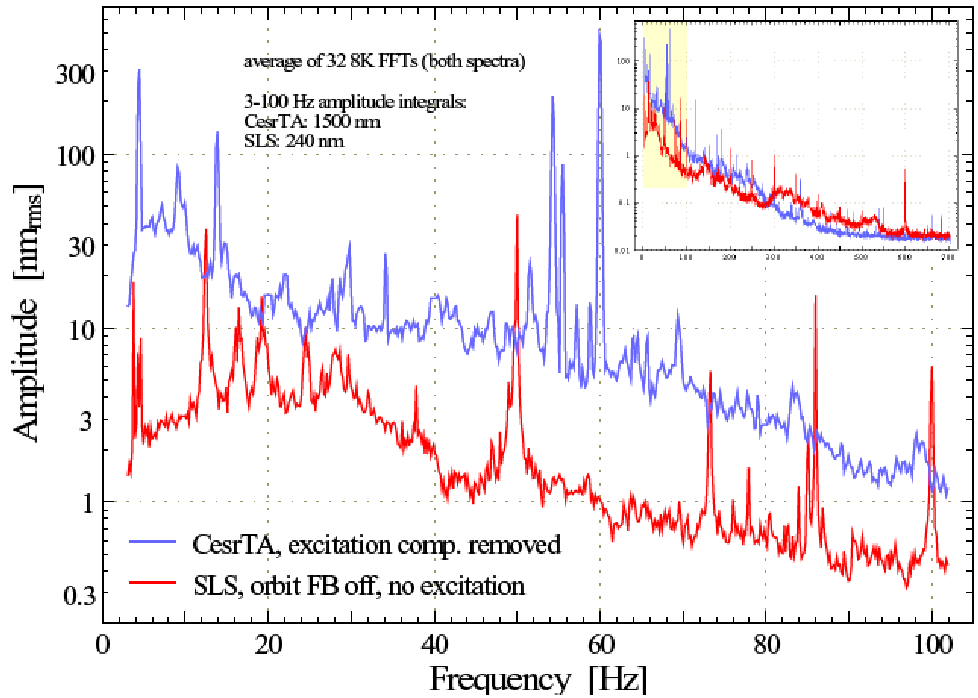
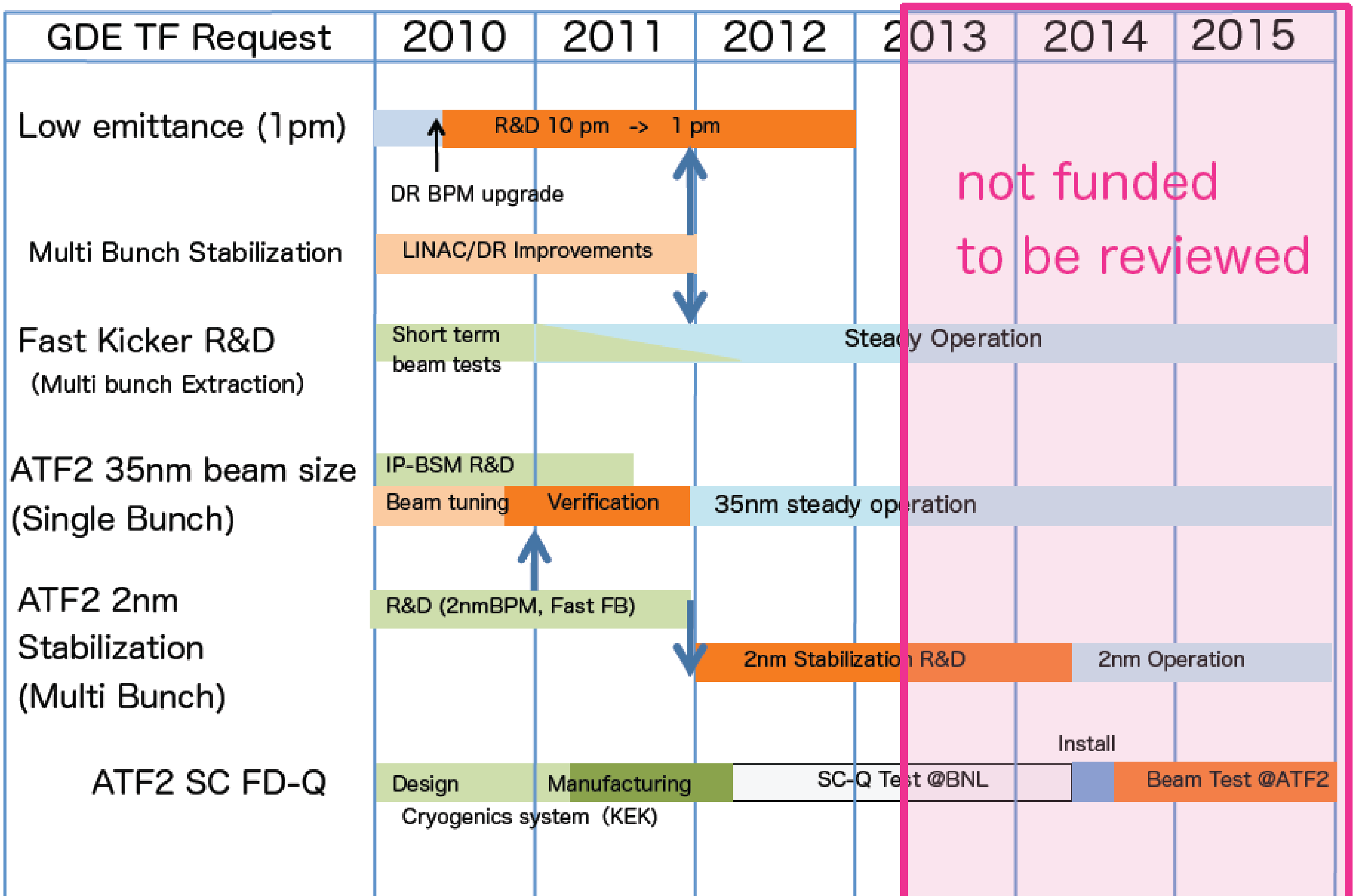


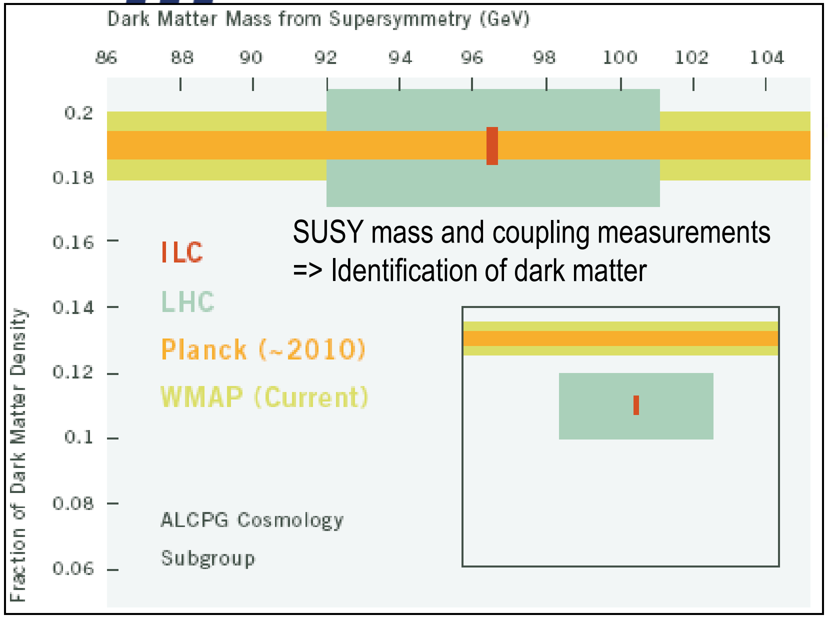
Figure 4: Comparison of CesrTA and SLS spectra, shown in Fig. 2 and 3, respectively.

IPAC10 paper

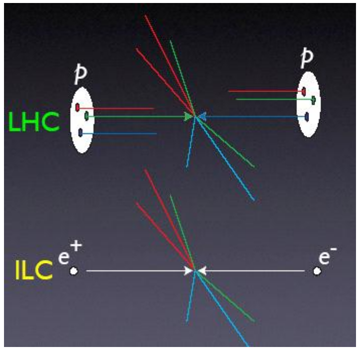
ATF long term plan

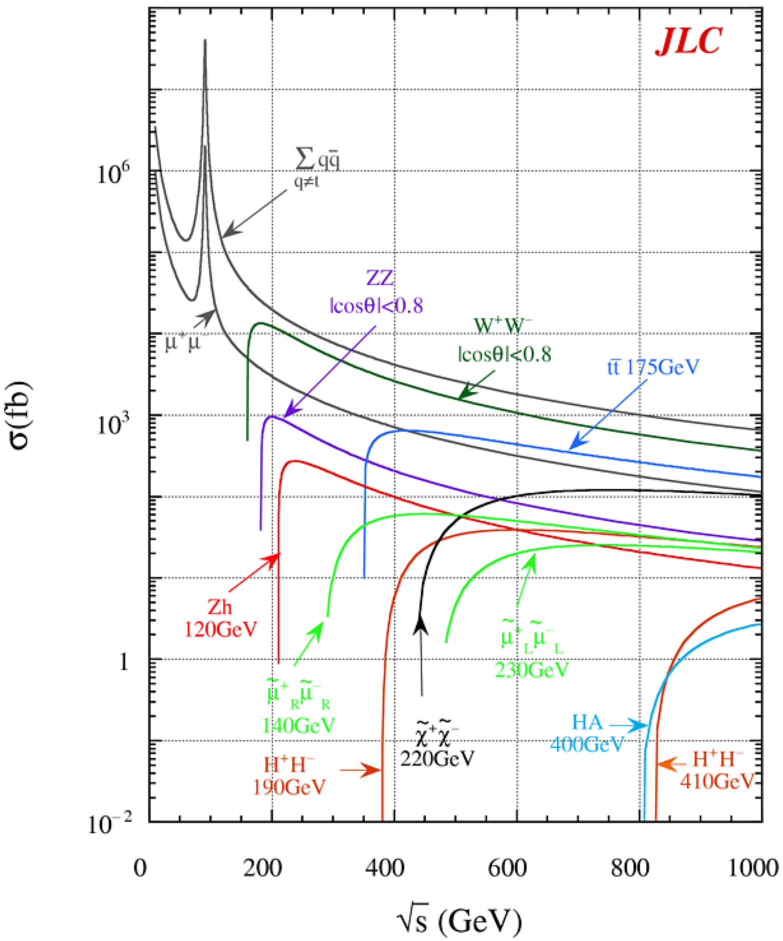


2010年 5月 13日 木曜日



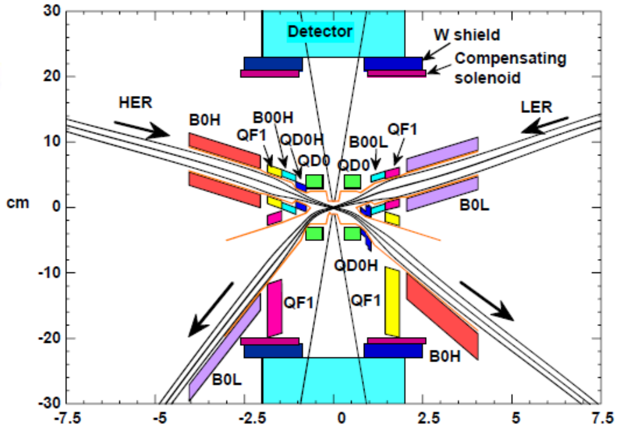
- Higgs Mechanism
- Supersymmetry
- Strong Electroweak Symmetry Breaking
- Precision Measurements

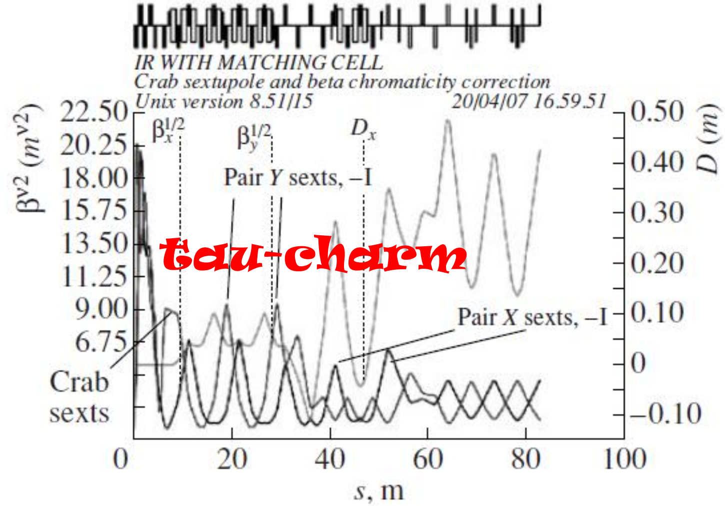


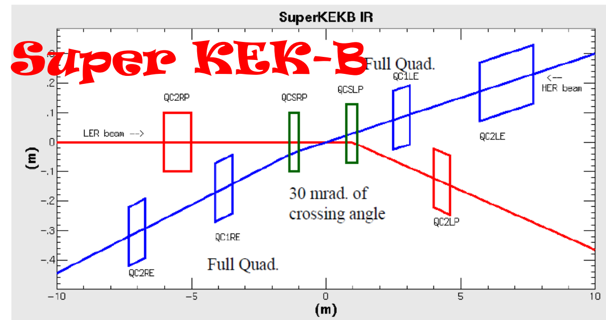


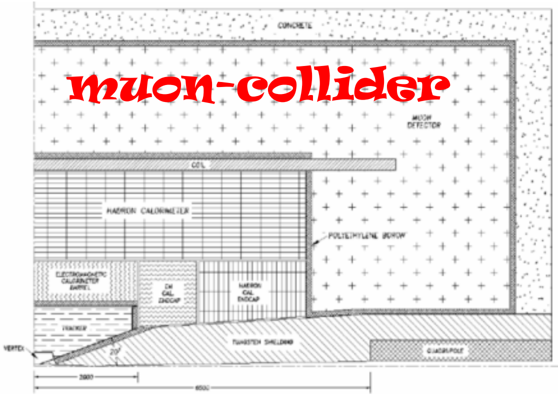
Realization of ILC experimental potential requires rigorous design of detectors and robust MDI

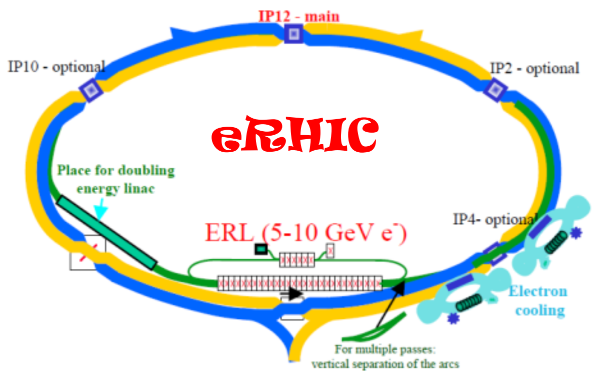
Super-B











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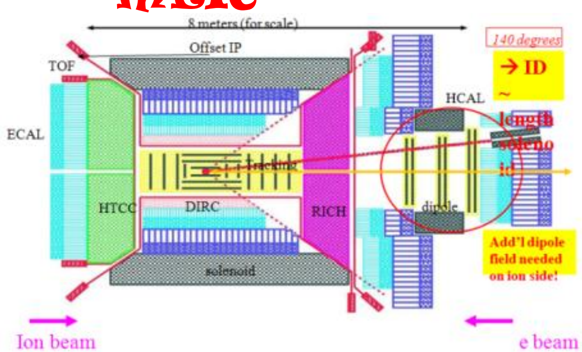

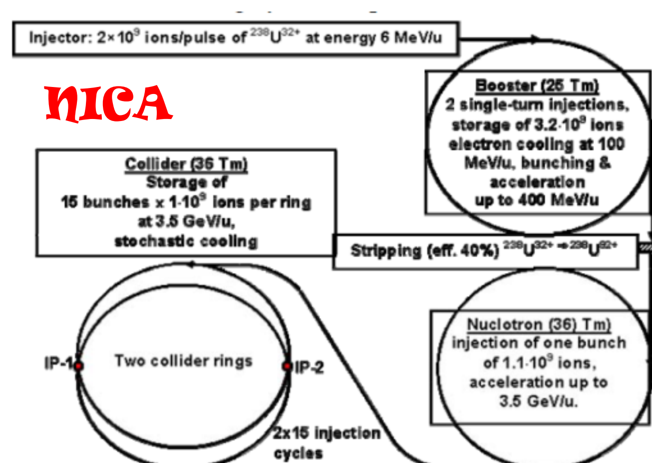

MDI design work may be synergic with MDI efforts for other planned and considered colliders

Final words