# LDC and the 14 mrad Crossing Angle

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LDC General Phone Meeting

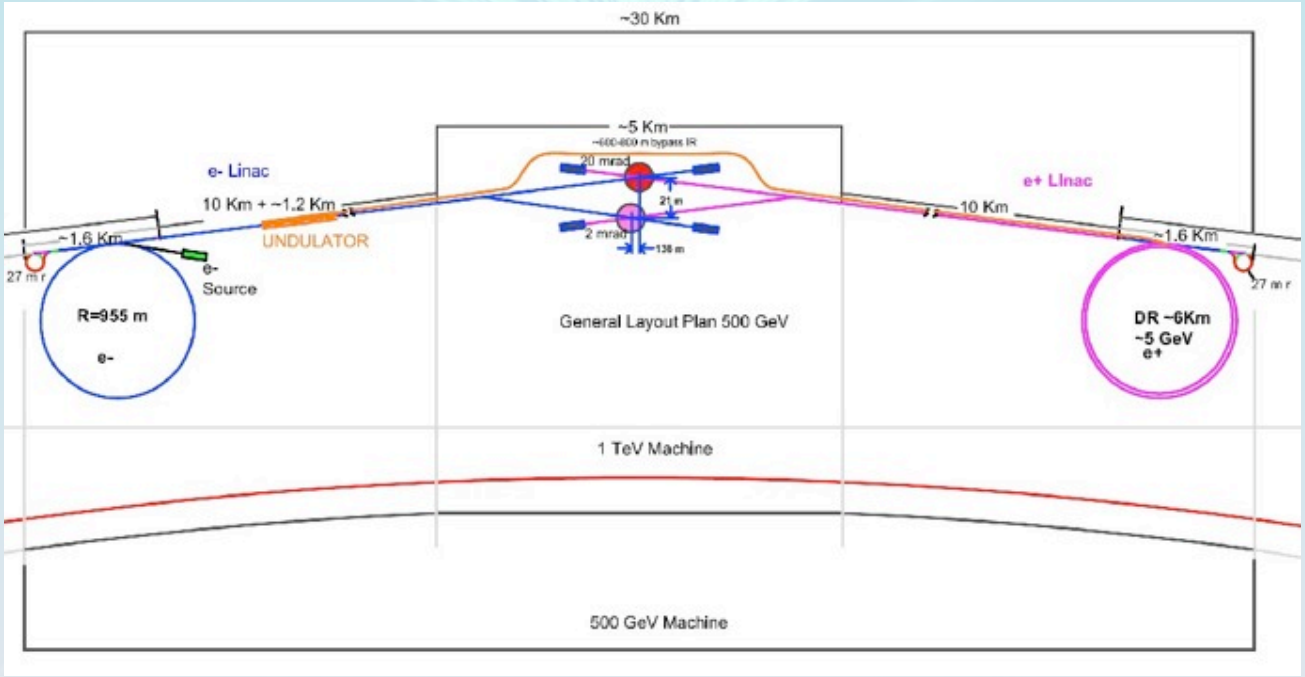
24. August 2006

# The ILC Baseline

- The ILC baseline has been developed from the discussions at Snowmass 2005.
- The baseline was documented in the ‚Baseline Configuration Document' BCD and finalised at the GDE meeting in Frascati in November 2005.
- BCD also contains ‚alternatives': design choices which offer attractive benefits (better physics, less cost) and may become baseline but still need more R&D.
- BCD was put under configuration control.
- Changes to the BCD need the approval of a decision process initiated and controlled by the Change Control Board (CCB) of the GDE. Chair: Nobu Toge, KEK.

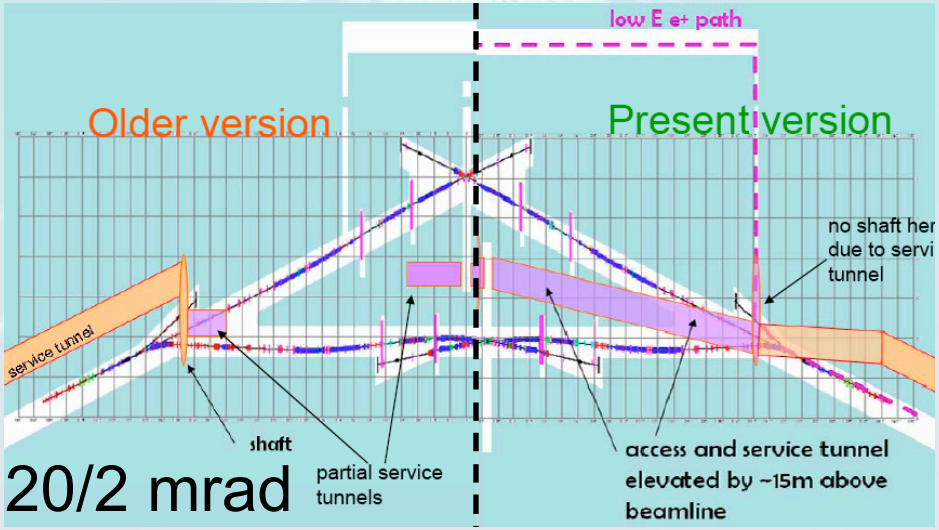
# ILC Baseline Design

- The baseline design was mainly driven by physical and technical requirements → Baseline Configuration Document
- Costs are becoming a major issue now → Reference Design Report
- ILC Baseline Design is currently under review by the GDE



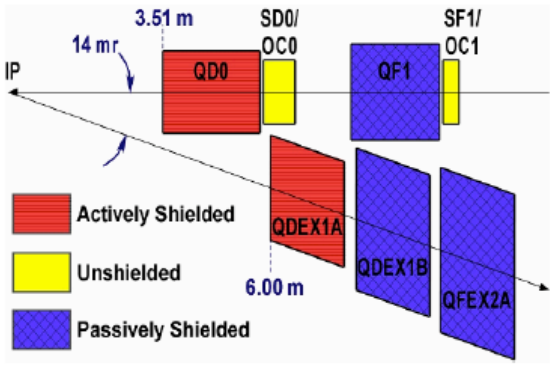
# BDS Change Request

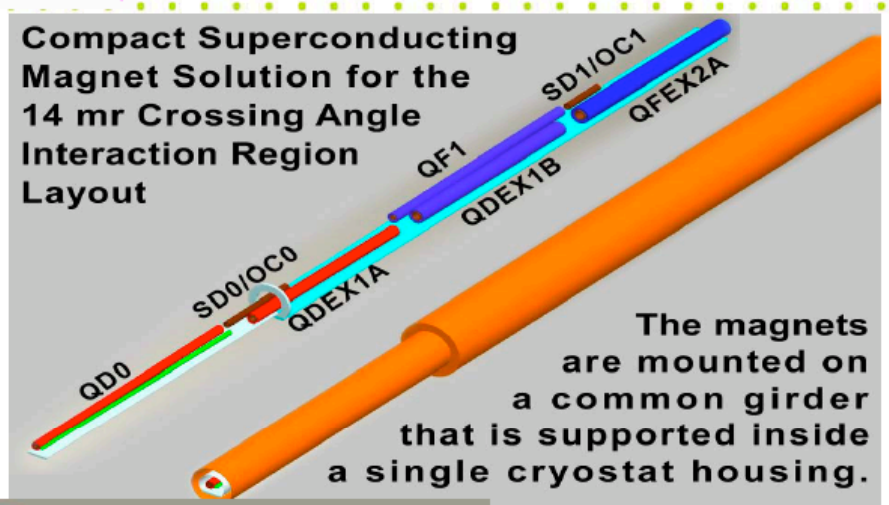
- Beam Delivery System change request
  - Submitted on July 29th to the CCB
- Changing the baseline from 2/20 mrad crossing angles to a symmetric configuration of 14/14 mrad
- Both detectors will be placed at the same longitudinal position (z=0) in one detector hall
- Reason: substantial cost savings

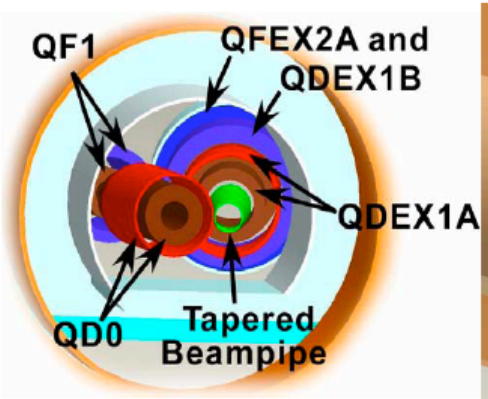


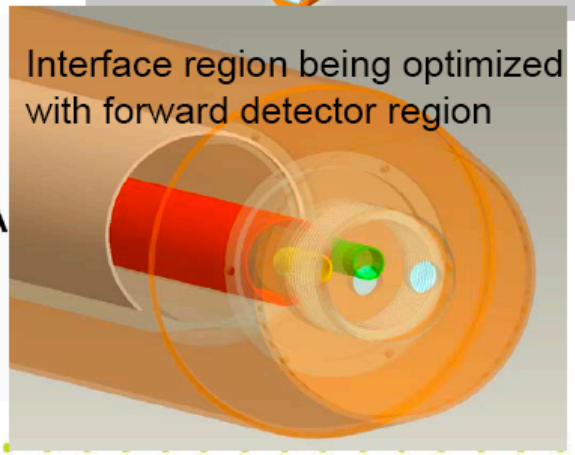
# 14/20 mrad Technology

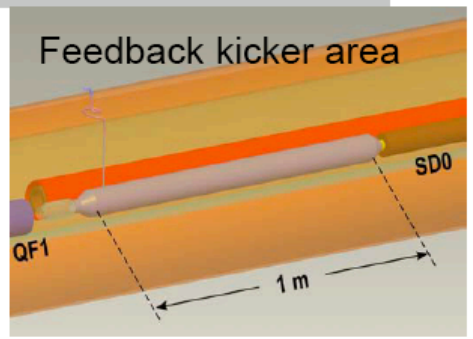
## 20/14 mrad IR



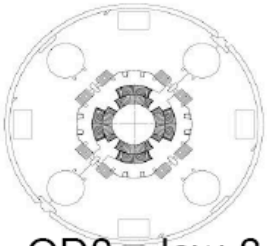



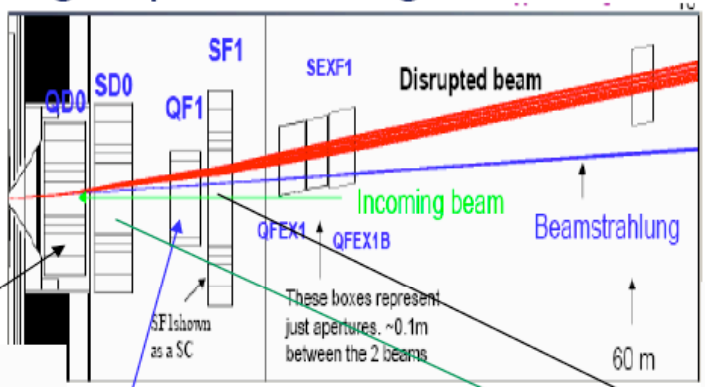

July 22, 2006 VLCW06 — Global Design Effort — BDS R & D 8

## 2 mrad IR

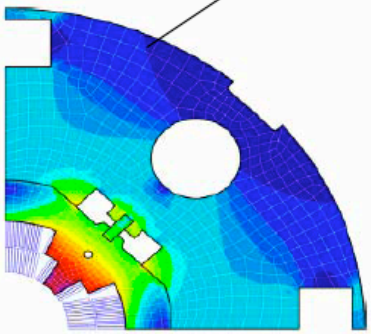
- To extract the disrupted spent beam+ beamstrahlung requires large aperture magnets



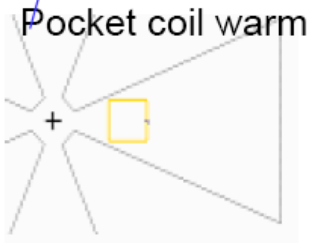
QD0 ~ low-β
LHC quad




Large aperture,
R= 88 mm (SD0),
112 mm(SF1)
sextupole design

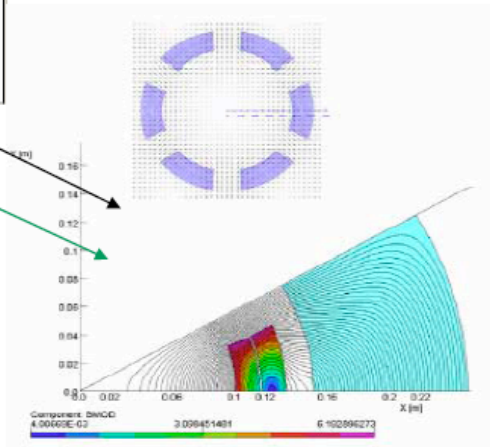


Kashikhin, FNAL



Pocket coil warm QF1

Spencer, SLAC



Kashikhin, FNAL

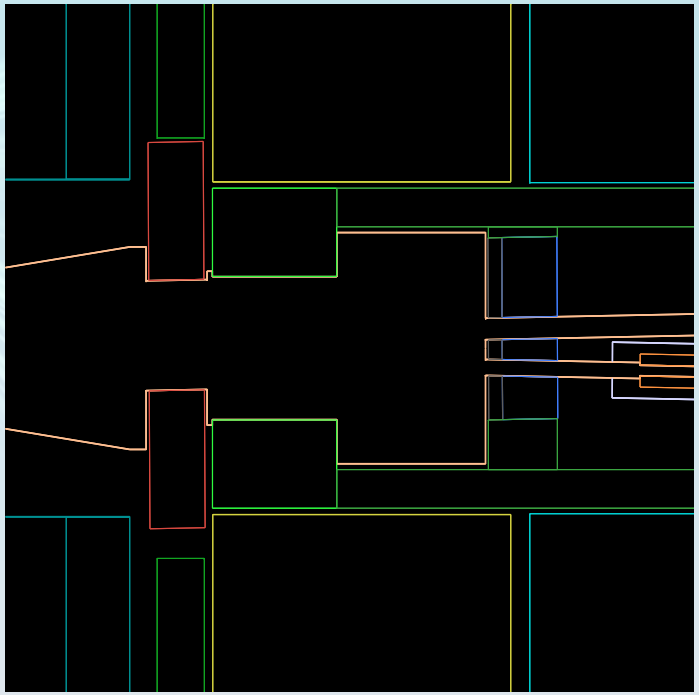
# MDI Panel Response

- The MDI panel has been asked by the CCB to response to the CCR
- The CCR has been discussed in an MDI panel phone meeting on August 15th. The MDI panel issued a statement:
  - Main physical issue for the 14 mrad crossing angle is a reduced efficiency compared to the 2 mrad case in some SUSY searches due to the second hole in the BeamCal.
  - Background levels are expected to be better than in the 20 mrad case and can be improved with Anti-DID.
- MDI panel thinks 14 mrad x-angle is acceptable, but smaller crossing angles would be preferred. R&D work on the 2 mrad scheme should continue.
- Single experimental hall at z=0 is acceptable, however:
  - 14 mrad x-angles give just 28.4 m separation of the two detectors.
  - If a 3 m separation wall between both detectors is needed, just 12.7 m remain for detector opening in beam position. This seems to be tight but manageable. Self shielding detectors might make the wall obsolete.
  - Some concerns on the mechanical coupling of the two IRs were raised (vibrations etc.).

# Implications for LDC

- 14 mrad crossing angle needs to be implemented in the full detector simulations → MOKKA
  - this includes optimisation of the LDC forward region!
- Background studies need to be (re-) done

- Work is in progress:
  - Starting point: 20 mrad x-angle design
  - DESY team is at work:
    - A. Vogel, R. Schmidt, S. Niehage, KB
  - Will have results for Valencia
- No big impact expected:
  - If it works for 20 mrad, it should work for 14 mrad....
  - Detector integration might be an issue



# Summary

- A change request has been submitted to change the beam delivery system to a design with two interaction regions with a 14 mrad crossing angle each. The two detectors should be placed in one single hall at z=0.
- The change request has been discussed in the MDI panel and will get support.
- There are implications for the LDC design
  - 14 mrad design of the forward region needs to be developed
  - Detector assembly issues might be affected due to tight space between detectors
- Impacts on the LDC performance is expected to be small
  - Mainly reduced performance in special SUSY searches
  - Backgrounds should be better than 20 mrad → to be confirmed!
- If you have concerns, please contact me soon!