NLC - The Next Linear Collider Project

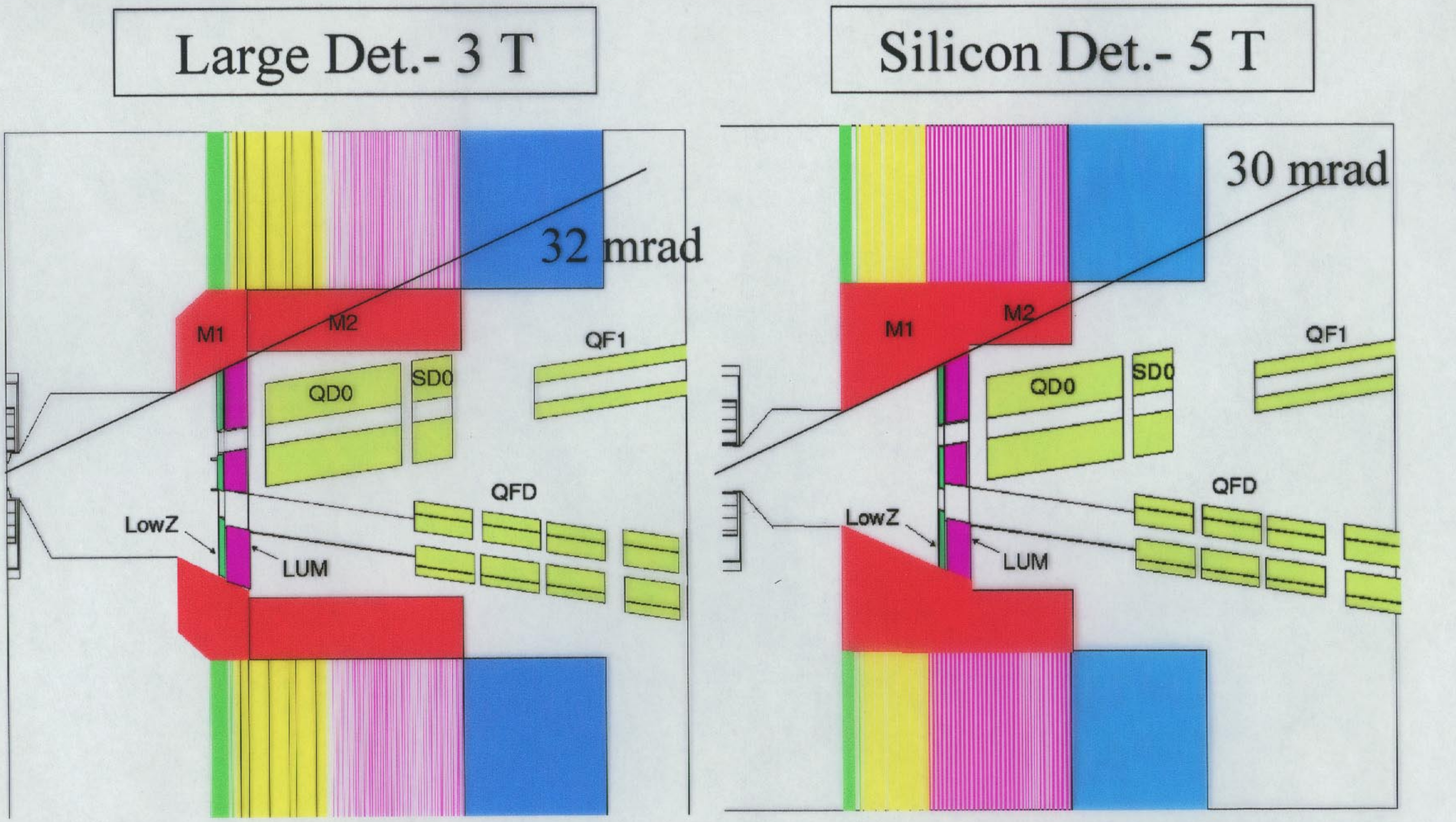
Nanobeam Interaction Region Issues

Tom Markiewicz/SLAC

Session #4, Nanobeams 2002, Lausanne, CH

3 September 2002

NLC Detector Masking
Plan View w/ 20mrad X-angle



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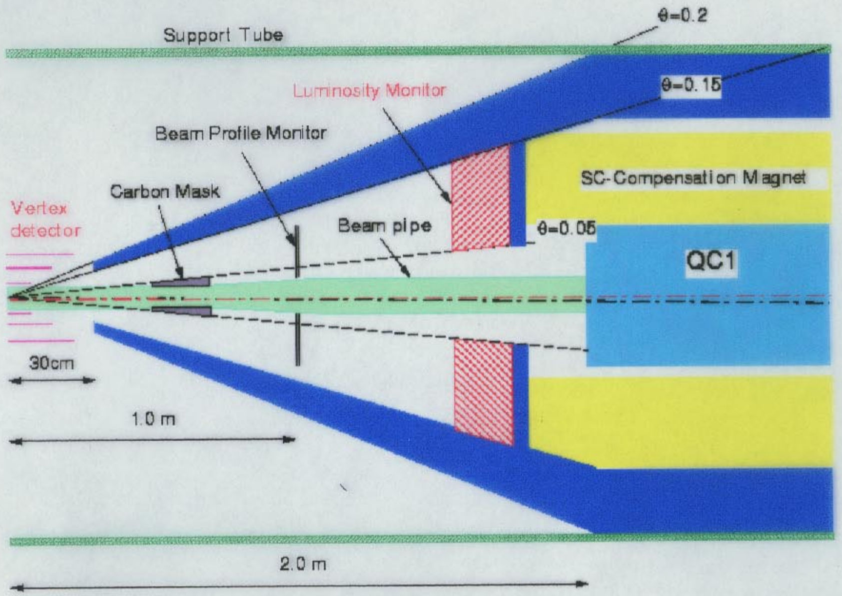
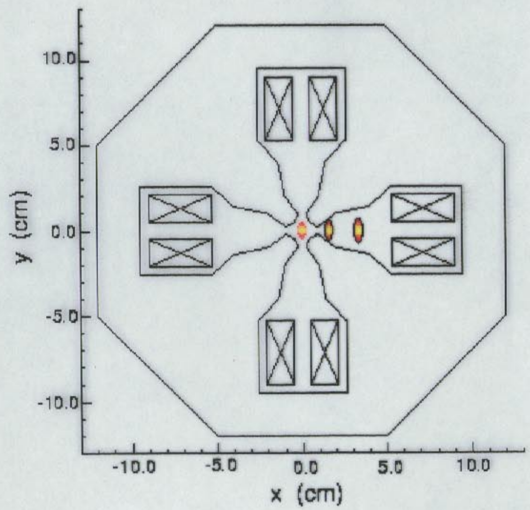
JLC IR
8 mrad Design

Elevation View



- •Iron magnet in a SC Compensating magnet
- •8 mrad crossing angle
- •Extract beam through coil pocket
- •Vibration suppression through support tube



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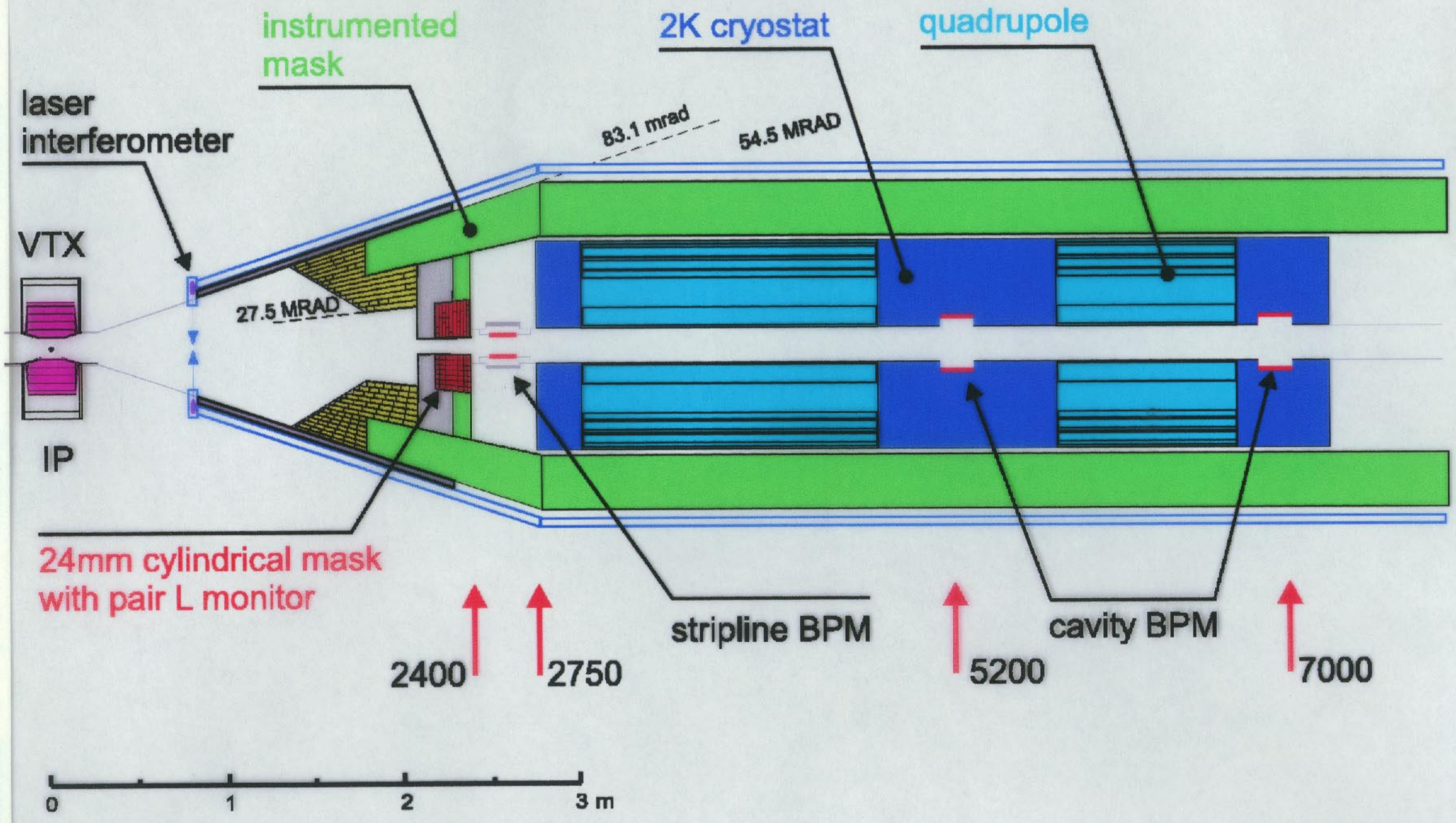
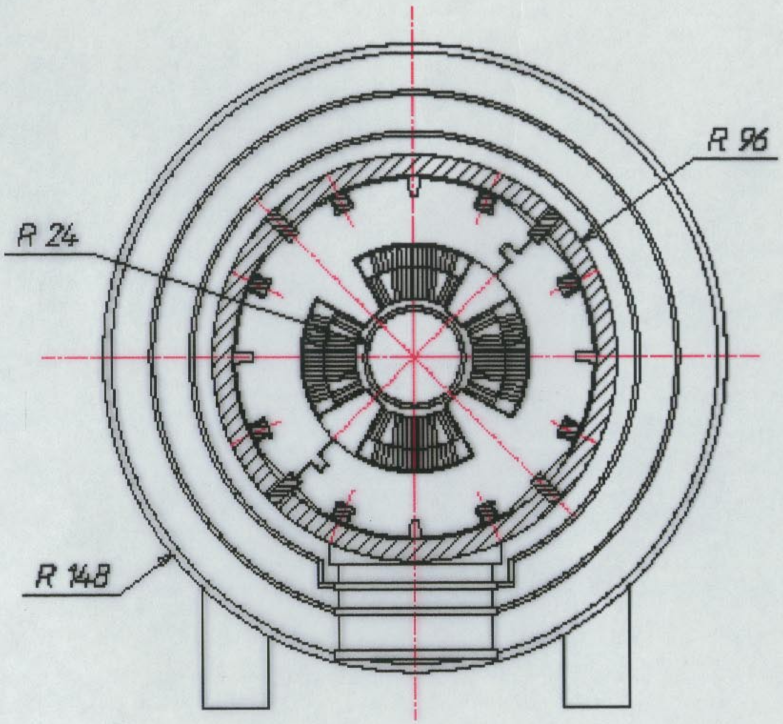
TESLA IR

Instrumented W Mask & Pair-LumMon w/ Low Z Mask



TESLA SC Final Doublet Quads
Mature LHC based Design

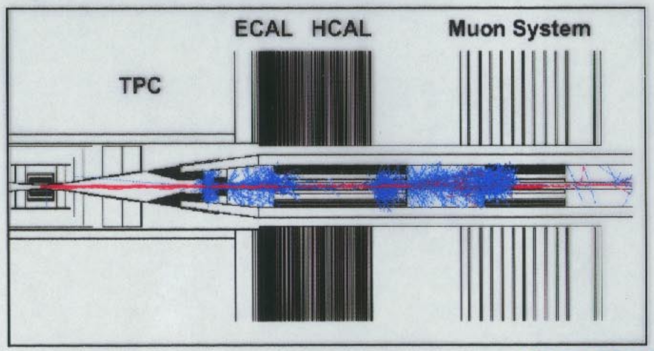


QD0:

- L=2.7m
- G=250 T/m
- Aperture=24mm

QF1:

- L=1.0m

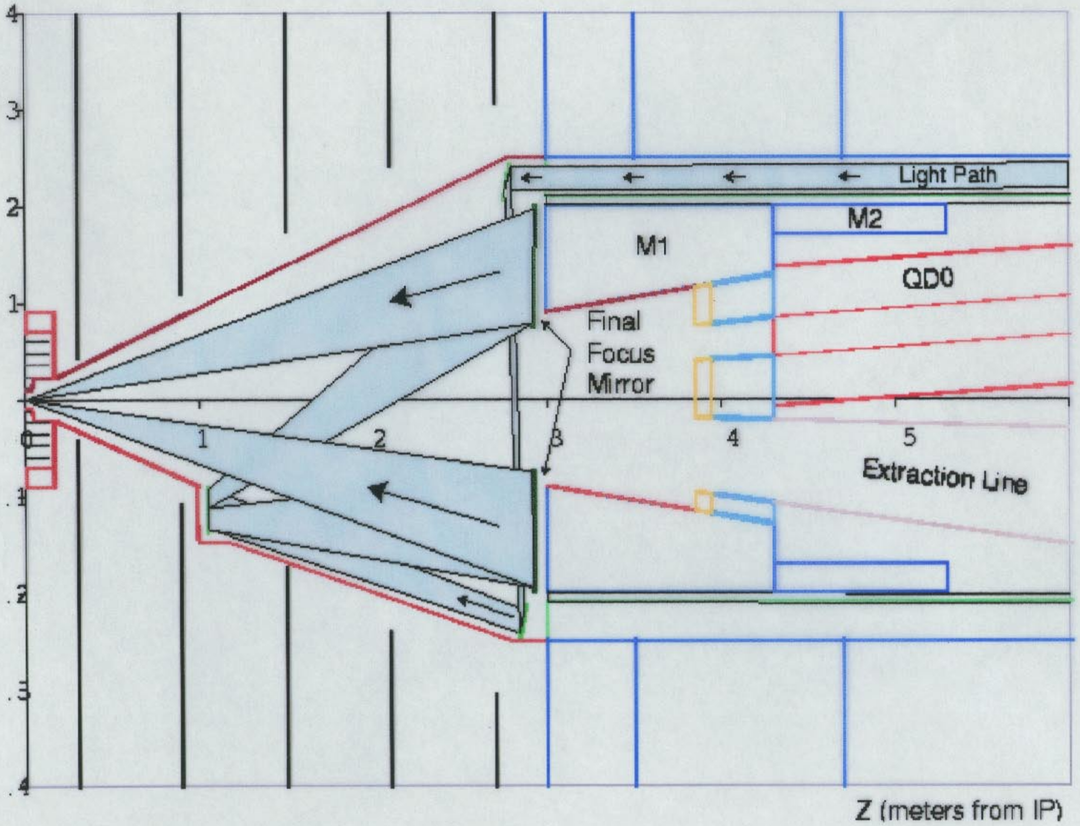


Tom Markiewicz

$\gamma\gamma$ IR

Differences w.r.to e+e- IR

- Annular Mirror system
- 10 mrad exit aperture instead of 1 mrad
- 30mrad θ_C to accommodate exit aperture
- Larger inner radius of VXD as first 2 layers of LD/SD VXD look in direct line of sight w/dump



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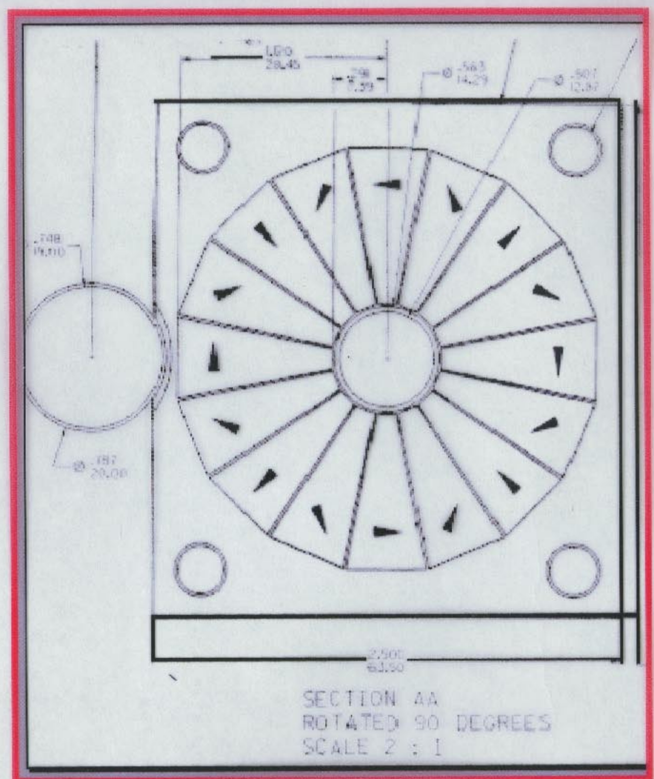
NLC Baseline: Permanent Magnet Quad

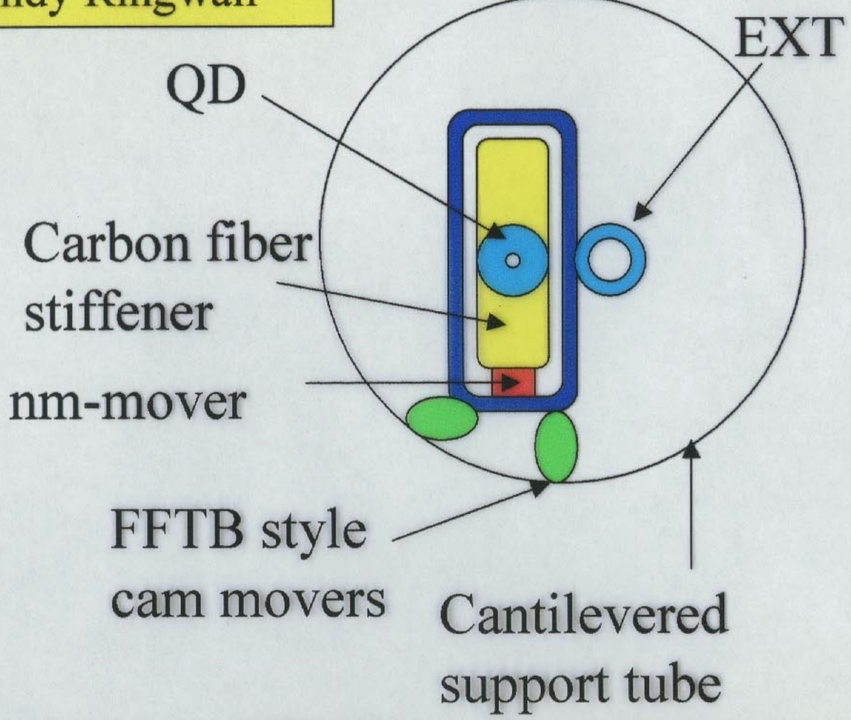
Compact, Stiff, Connection Free

Control B by controlling magnet position in Closed-Loop FB

M. Kumada
I. Iwashita
E. Antokhin



Andy Ringwall



Knut Skarpaas

Magnet	Aperture	Gradient	Rmax	Z_ip	Length
QD0	1.0 cm	144 T/m	5.6cm	3.81 m	2.0m
QF1	1.0 cm	36.4 T/m	2.2cm	7.76 m	4.0 m

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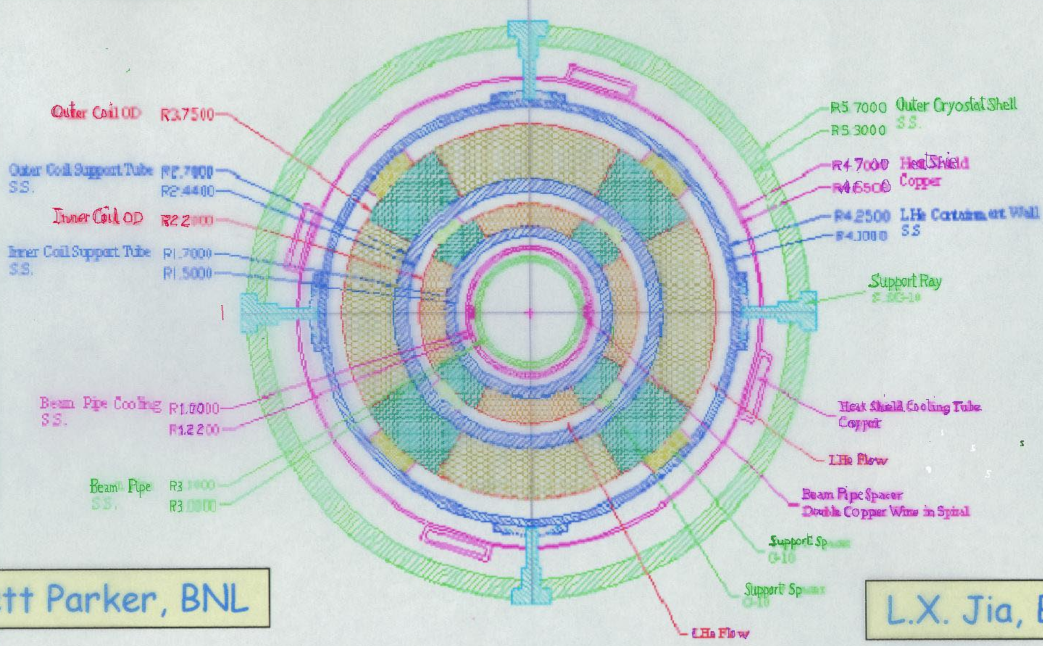
NLC Future? SC Final Doublet based on HERA & BEPC technology

Compact 5.7cm Radius Warm Bore Design



Brett Parker, BNL

L.X. Jia, BNL

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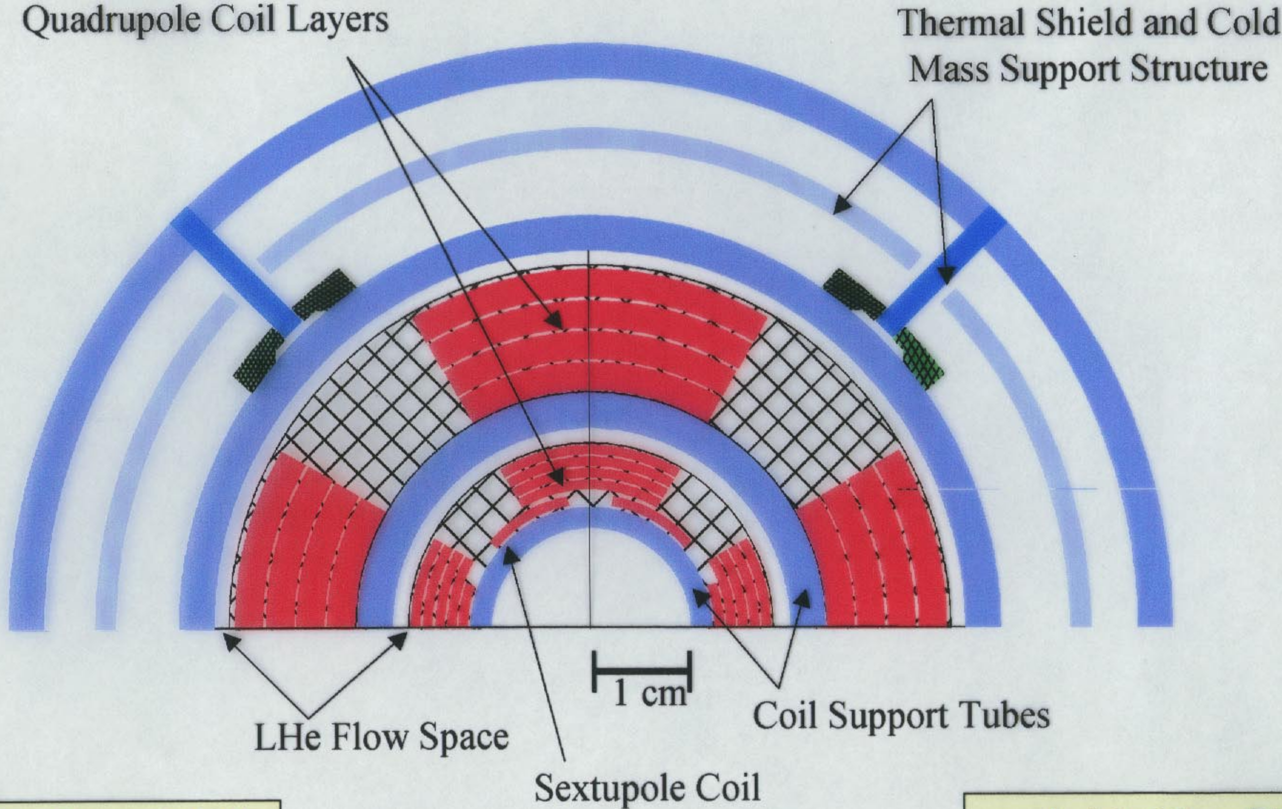
Cold Bore NLC SC Quadrupole w/ Integrated Sextupole Windings



Brett Parker, BNL

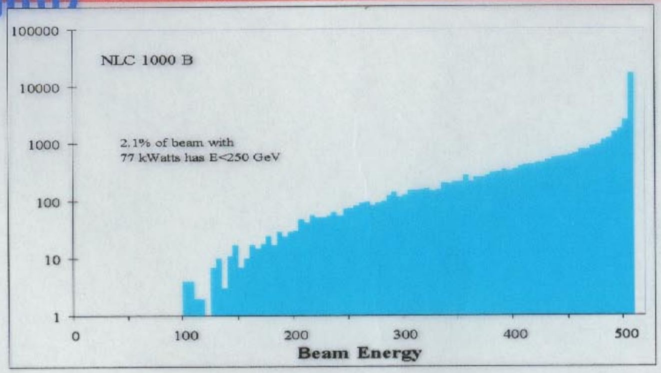
L.X. Jia, BNL

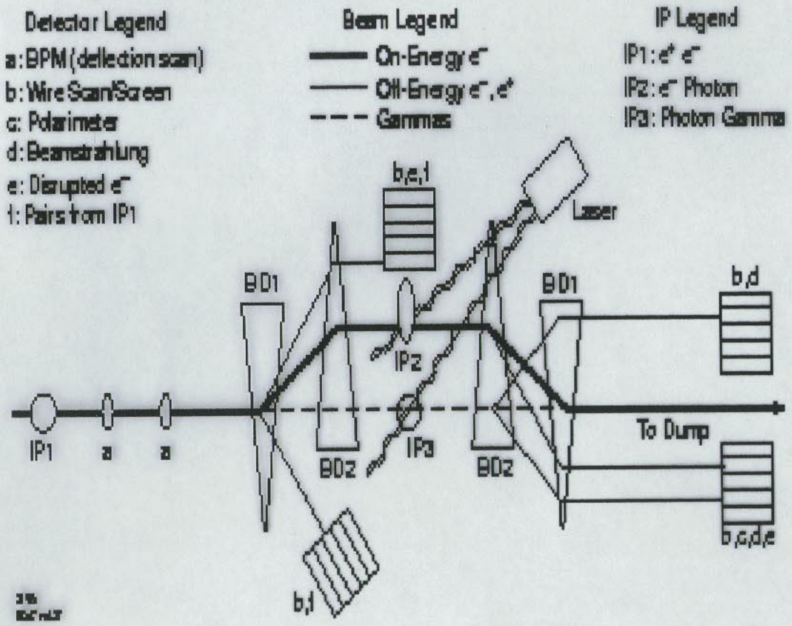
Tom Markiewicz

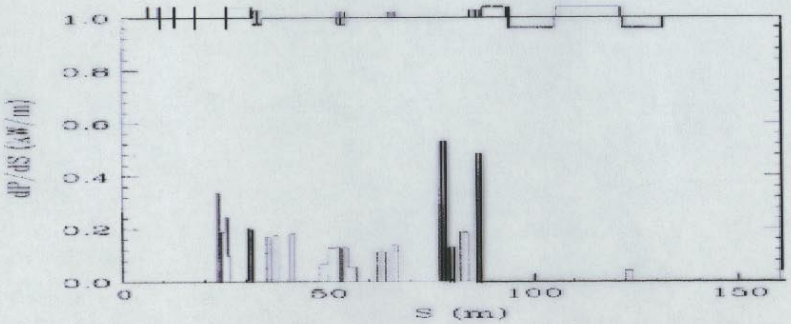
NLC Extraction Line

150 m long with chicane and common γ and e-dump

X-Angle allows separate beam line to cleanly bring disrupted beam to dump and allows for post-IP Diagnostics







0.2% of beam ~ 4kW lost @ 1 TeV

0-0.002% beam ~ 0-20W lost @ 500 GeV

TESLA
Vertical Extraction at 0°

Electrostatic separators at 20m

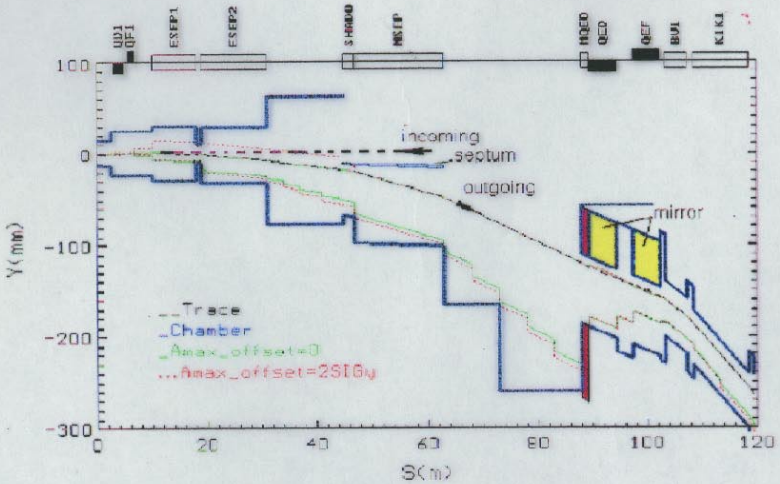
Shielded septum at 50m ($c\tau_B/2$)

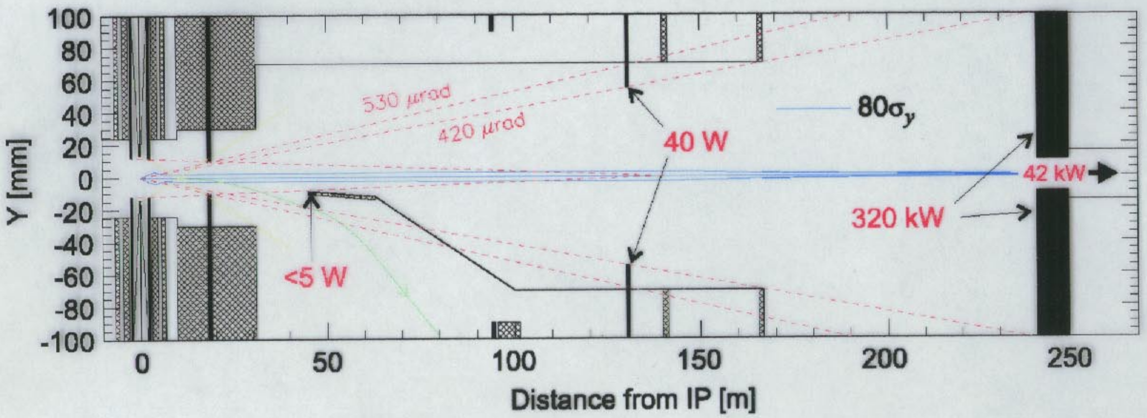
Dipoles to e-/+ dump at z=240m

Calculated losses OK

Challenging problem

No space for diagnostic equipment





Photons to separate dump at 240m with hole for incoming beam

Tom Markiewicz

- Nanobeam IR issues for TESLA:
  - Are there any?

Yes

- crossing angle needed? If yes, how large?
- Realistic design of laserwire/shintake monitor?
- IP feedback o.k. (already in TTF). But Tesla should also plan for optical/inertial anchors!

Tom