International Linear Collider

Beam Crossing Angle for γγ

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Introduction

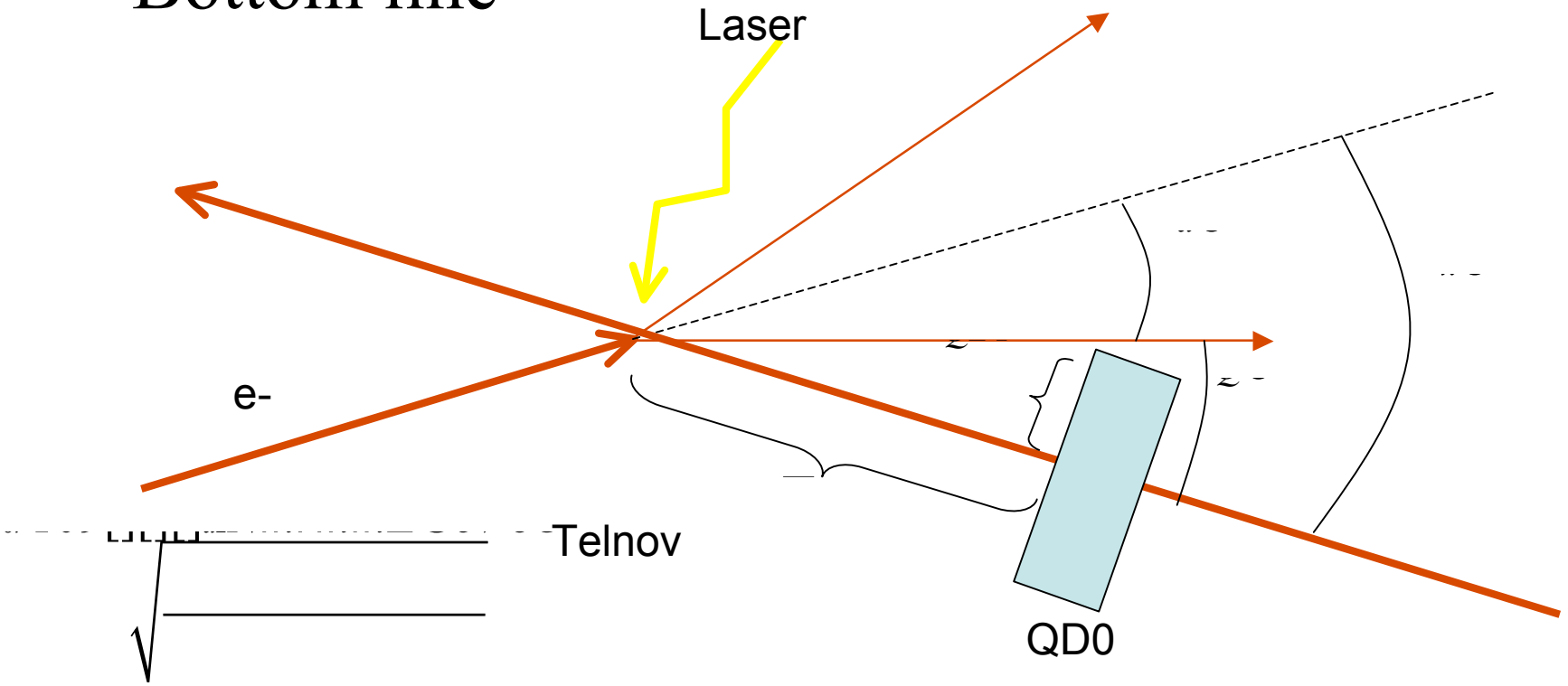
- γγ prefer large x-angle > ~25mr
- Strawman design
  - 2mr, 20mr

→ See:
if 20mr is possible
impact of 20mr on γγ

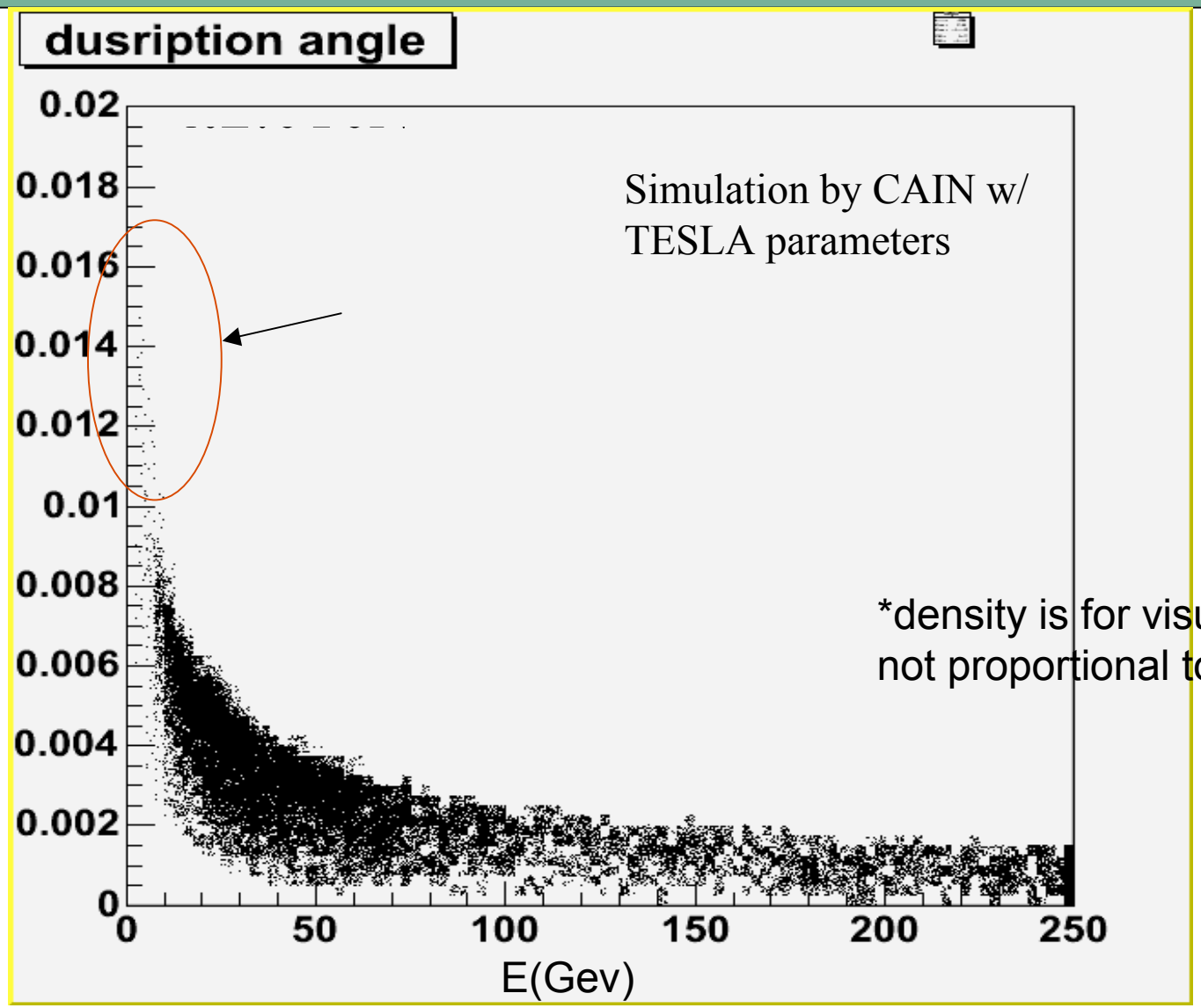
→ No conclusion yet:
What has to be done

Crossing angle consideration for γγ

- Bottom line



Simulation of Disruption angle

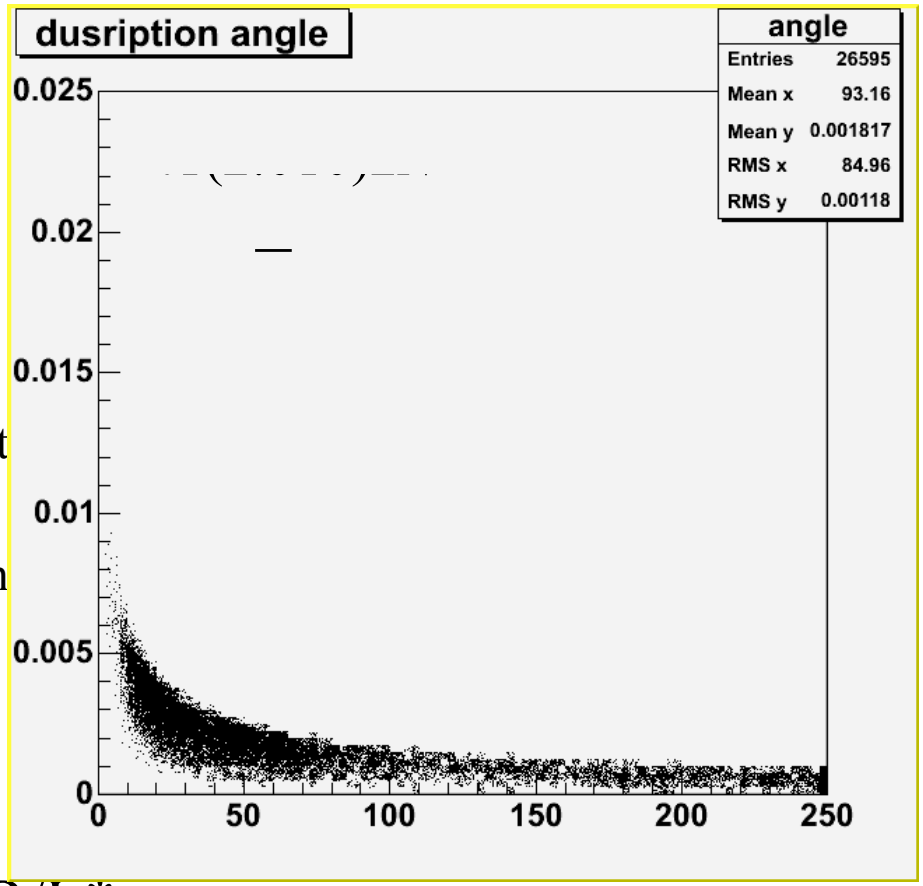


How to reduce crossing angle

- Disruption angle

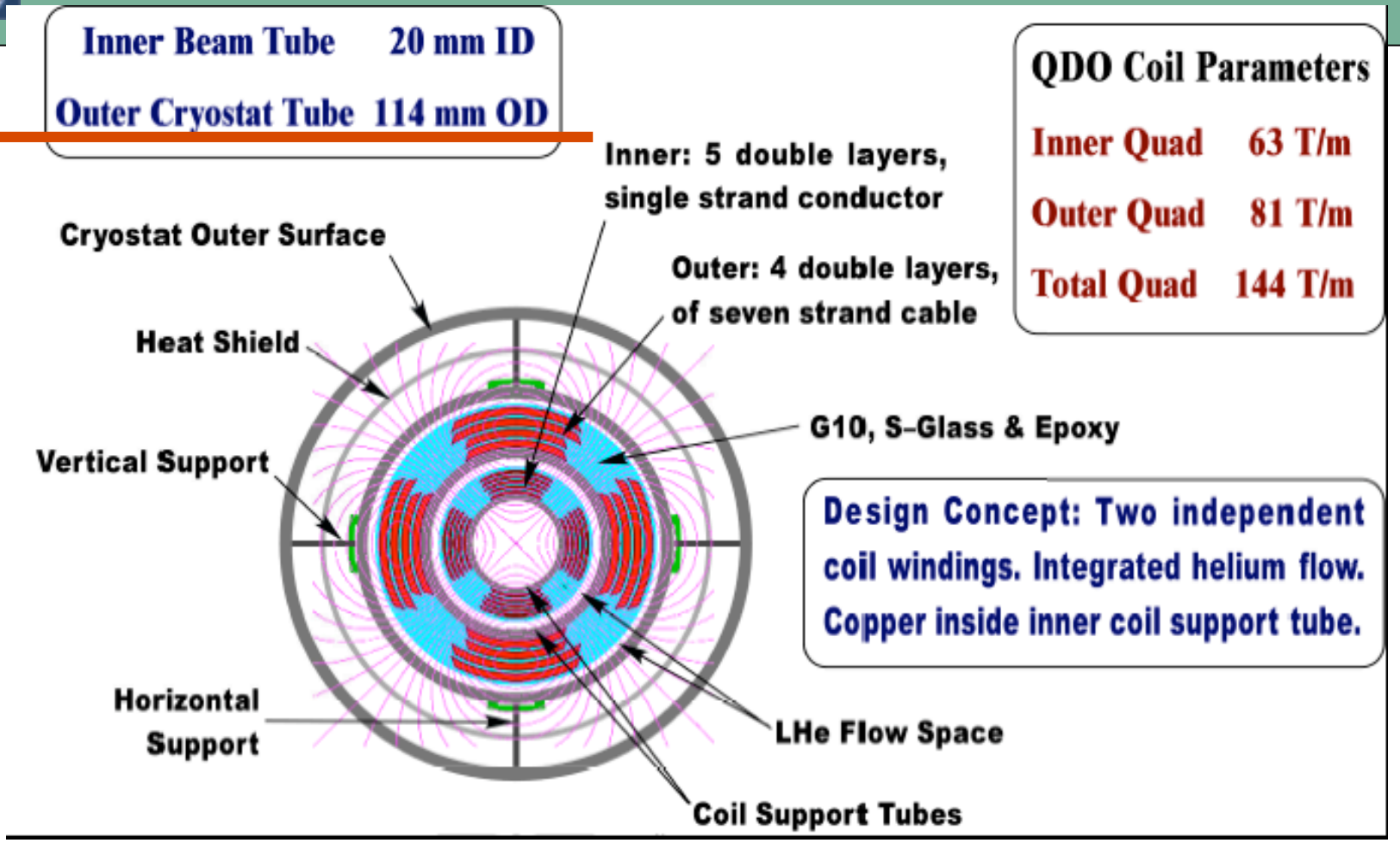
physics of Compton scatt

:controllable but reduce lum



reduce R/L*

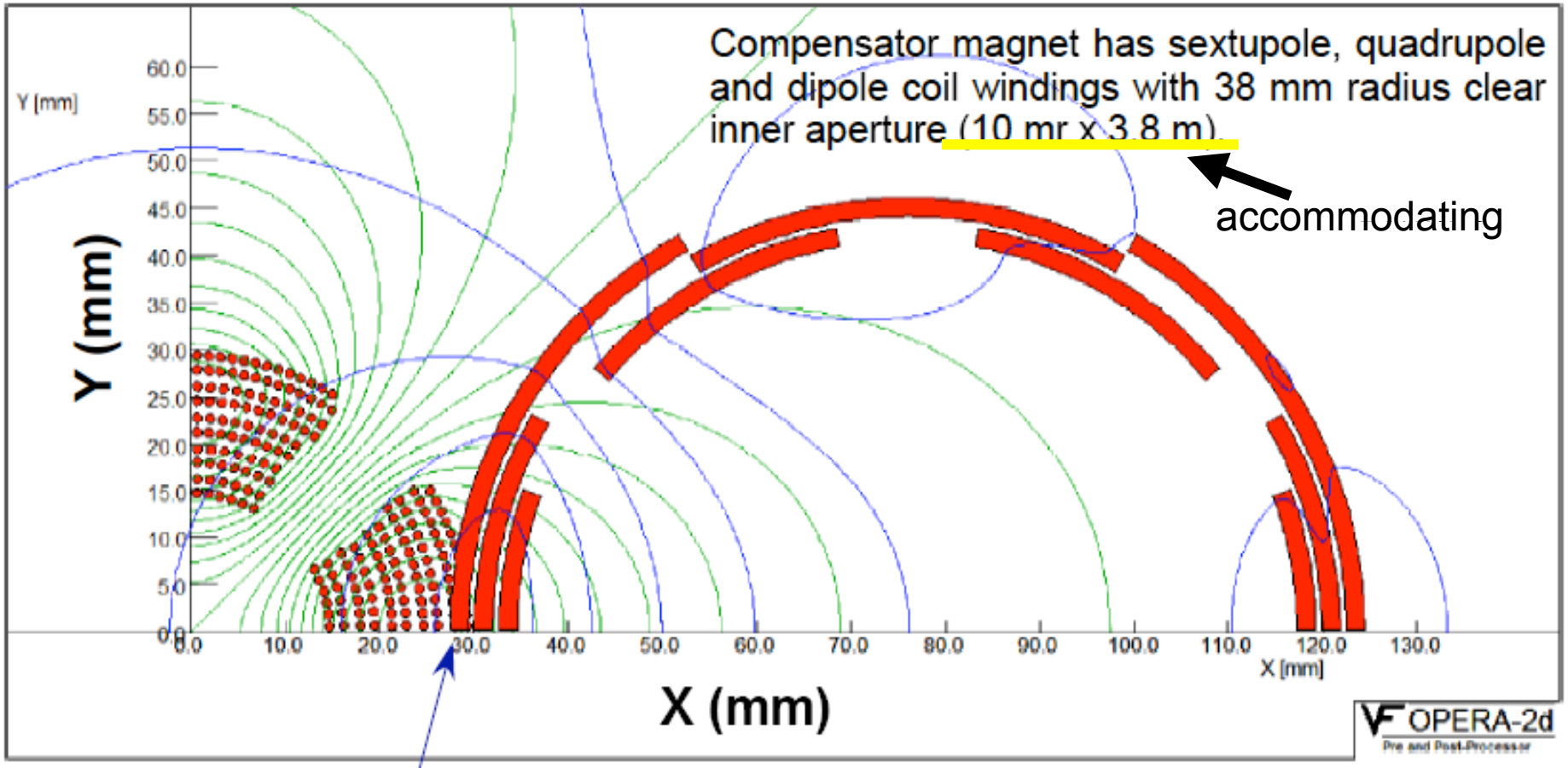
Compact SC Quad



— at L*=5m

QD0 Quadrupole Coil Overlaid with Compensation Coils

Brett Parker



Found that dipole coil can be made half as thick as shown.

Zero Field Point is at X = 76 mm (i.e. 3.8 m x 20 mr)

L*=3.8m,

What these effort means?

- γγ w/ ~20mr crossing angle may be possible

w/e+e- the beam parameters
(beta-x/y at the IP)

Price to pay:

Need to study
how small beta-x can be w/ fixed L* and QD

remember: photon collider wants/allows highest possible
geometric luminosity as the beamstrahlung is not a problem.

What has to be done

Two case studies

- θ_x =20mr: minimum modification from e+e-
  - same L*, smallest possible QD0, e+e- parameters
  - detail investigation for disruption angle
  - QD0 design (for fixed L*)

  ⇒ make sure if it is really possible to accommodate gg w/ e+e- parameters

  ⇒ try to find FF optics to minimize horizontal beta function
- 25mr < θ_x
  - most reasonable design of QD0 to date
  - detail investigation for disruption angle
  - FF design

Summary

- need expertized work in 3 area
  - final focus optics
    - given θx and L*, find optics to maximize geometric luminosity
      - do not mind beamstrahlung
  - final focusing magnet
    - find smallest possible rad
      find θ_Q
  - simulation of laser-beam and
    - detail investigation of lov
      with safe mergine
      - disruption angle, track
        backgrounds