Collimation Requirements in 2 mrad and Head-On

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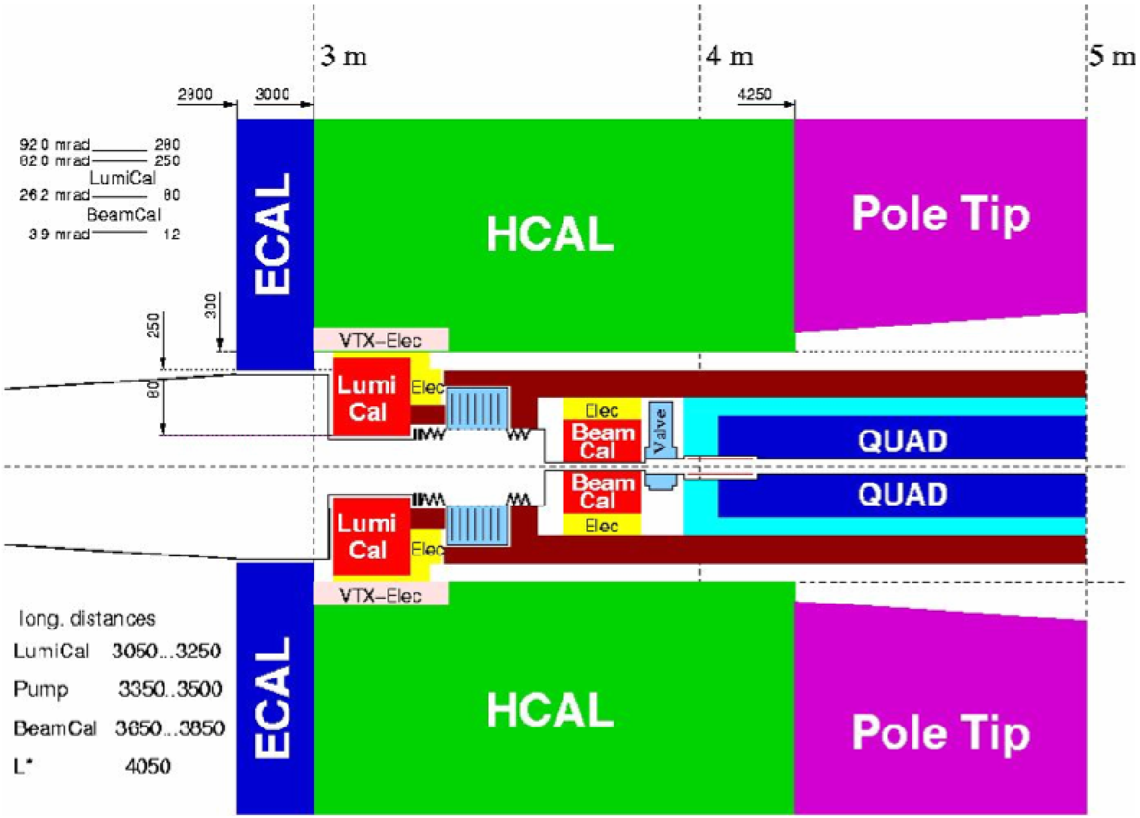
Method

- Collimation requirement - SR fan from final quads clears the IR apertures
- DBLT algorithm devised by O. Napoly
- Linear optics transfer matrices, ignore energy spread and chromatic correction
- Caution with non-zero crossing angles
- Dependence on Parameter Sets

IR Apertures

- Tightest aperture in IR is usually beamcal.



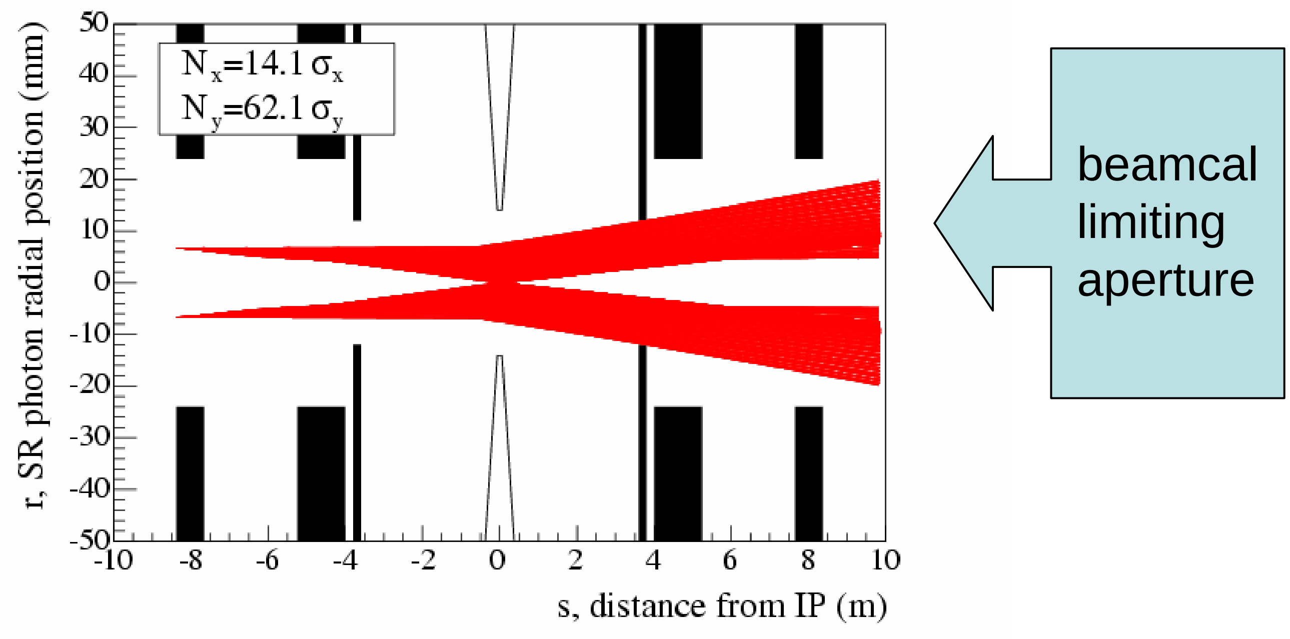
LDC design small angle

Beamcal acts as mask for backscattering.

Same radius as vertex detector to stop back-scatter into vxd

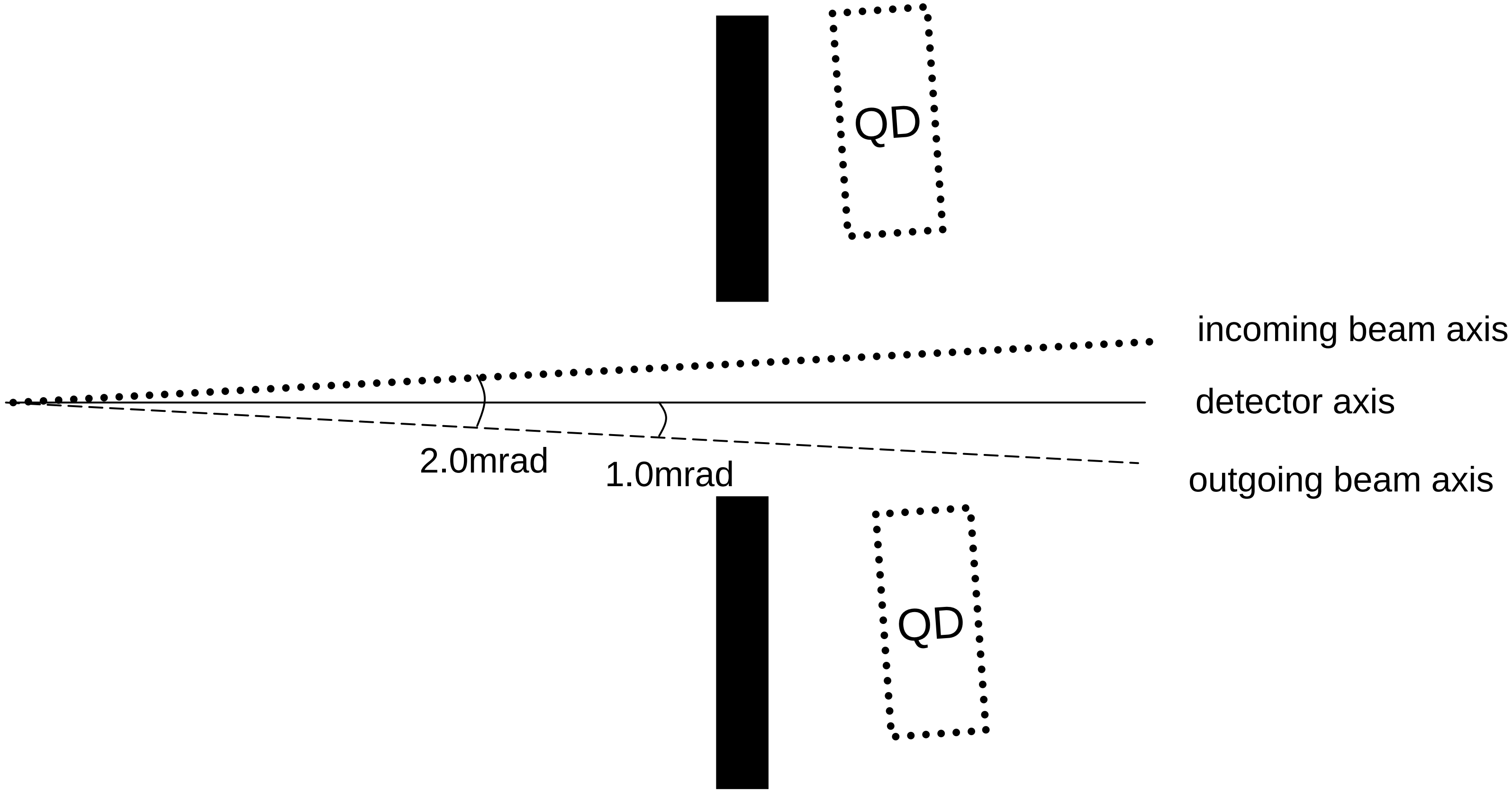
Head-On Scheme

- Symmetrical situation. Beams, SR, quads, beamcals share same axis



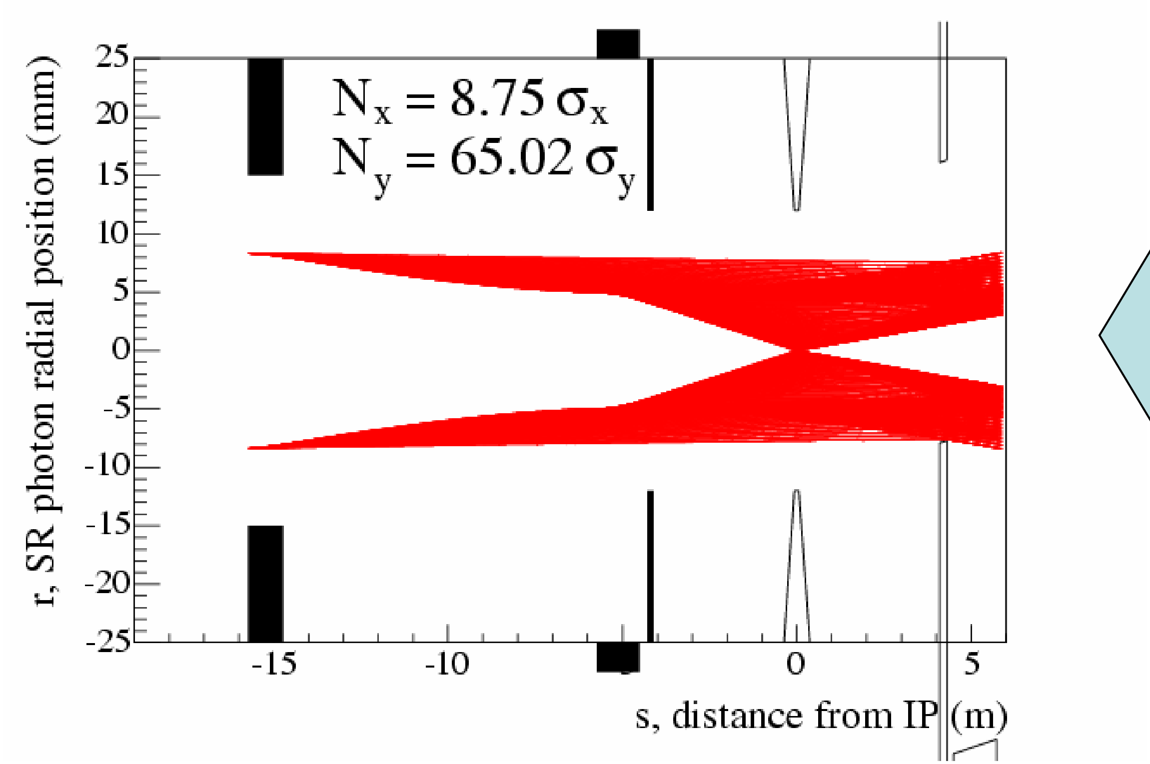
2 mrad Scheme

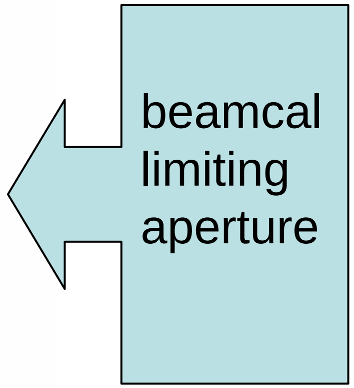
- Crossing angle symmetry problems



2 mrad Requirements

- Effective beamcal aperture of 7mm radius.





Parameter Dependence

- All previous results for <u>nominal parameters</u>
- Other parameter sets have smaller $\beta^* \rightarrow$ larger IP angles $\rightarrow$ tighter collimation
- 'Low P' & 'high lumi', β^* twice as small as nominal

Design	Collimation Depth
Head-On	$9.7\sigma_x$, $46.9\sigma_y$
2 mrad	$6.0\ \sigma_x$, $49.1\ \sigma_y$

Conclusions

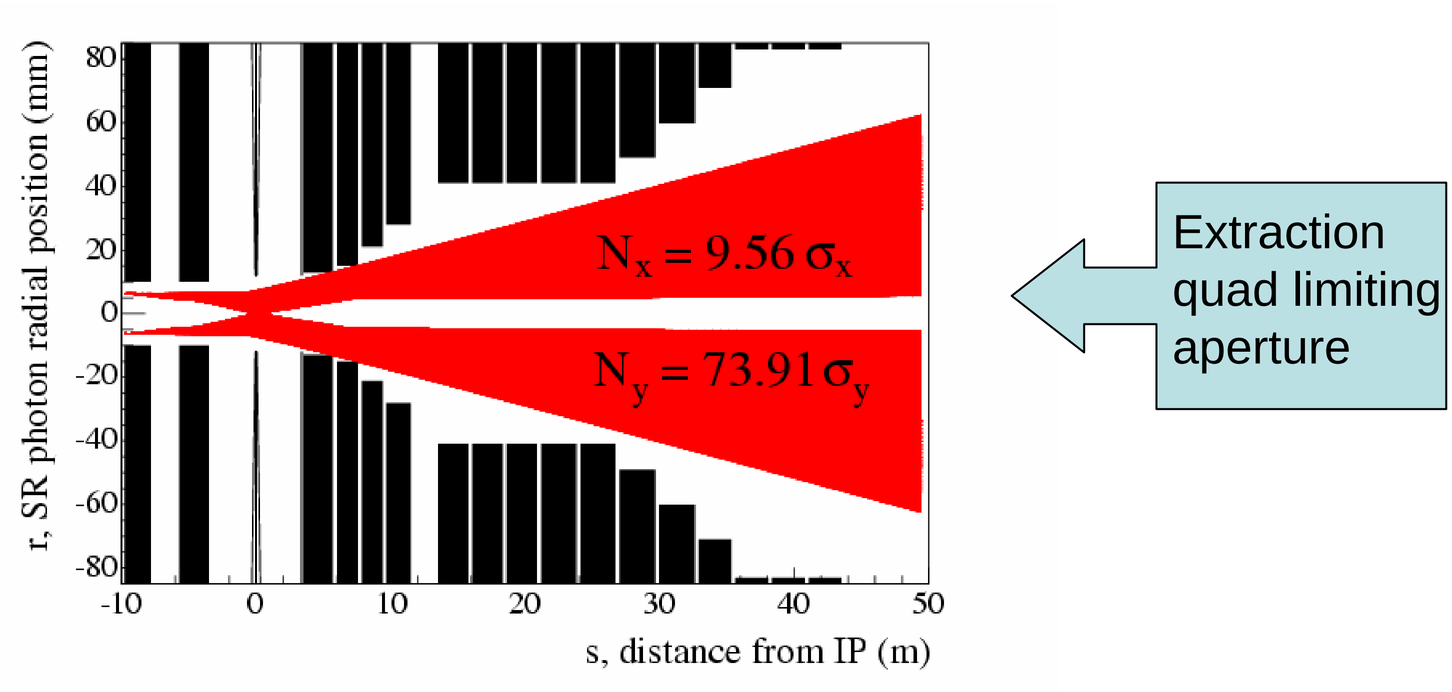
- Collimation depths OK for both designs for nominal params.
- High lumi & low P parameter smaller beta functions impose tight horizontal collimation depths on 2 mrad.

Notes & Backup Slides

- IP parameters for snowmass 20 mrad were from TELSA NOT nominal, because doublet and whole line was matched for TESLA params.

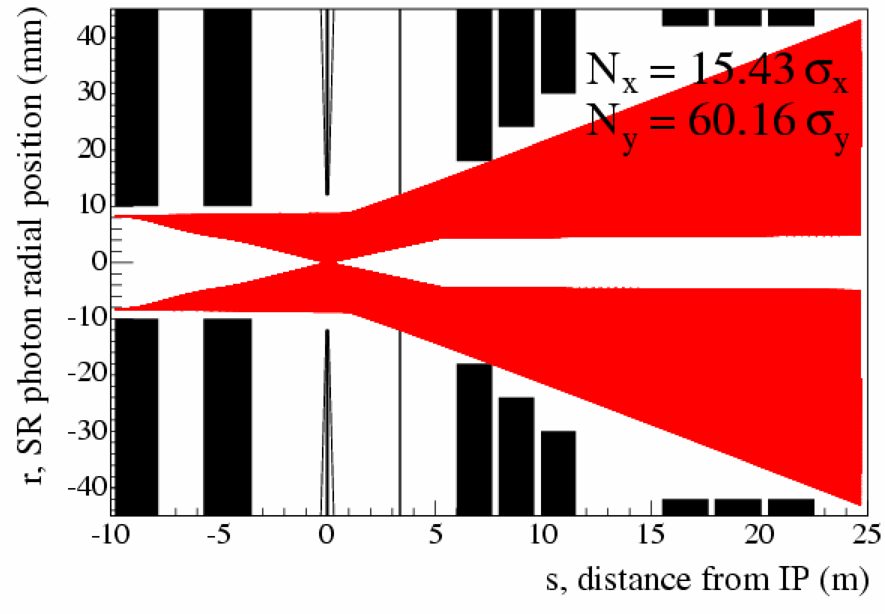
Comparison with 20/14 mrad

- 20 mrad design from Snowmass 2005



Comparison with 20/14 mrad

- 14 mrad design '2006c'
- Same final doublet to 20 mrad but extraction quads moved back 2.5 m (with increased aperture)



Extraction + beamcal quad limiting apertures