

Summary of Gamma Gamma Session

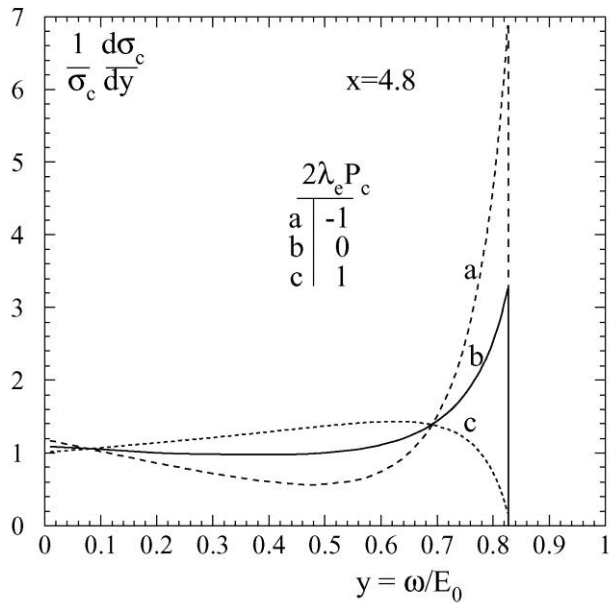
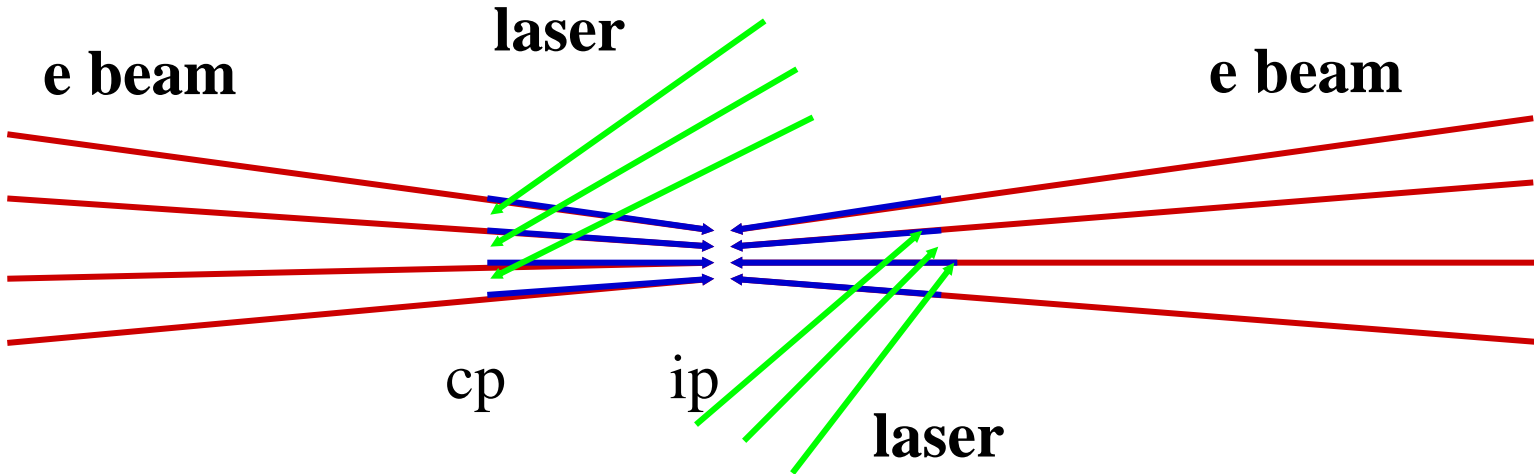
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Hiroshima University

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LCWS2013

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- Technology
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$\gamma\gamma/e\gamma$ Collider



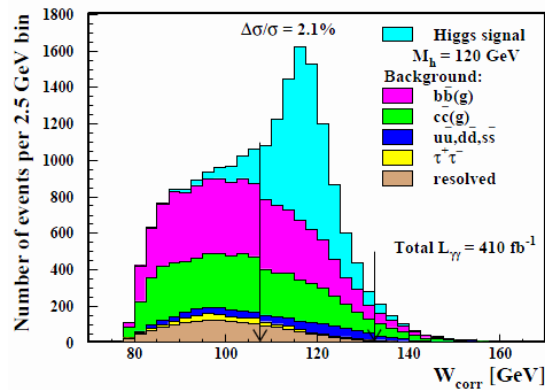
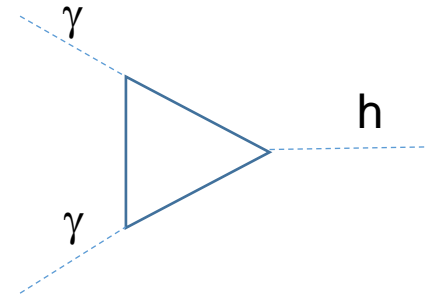
- γ spectrum is controllable
laser and electron polarization
- polarized photon beam
- $E_\gamma(\text{max}) \sim 0.8E_e$ typically

Physics (selected examples)

- S channel Higgs production

- $\gamma\gamma \rightarrow h \rightarrow b\bar{b}$

- $\delta(\text{Br}(h \rightarrow b\bar{b})\Gamma(h \rightarrow \gamma\gamma)) = 2\% \sim \delta\Gamma(h \rightarrow \gamma\gamma) = 2\%$



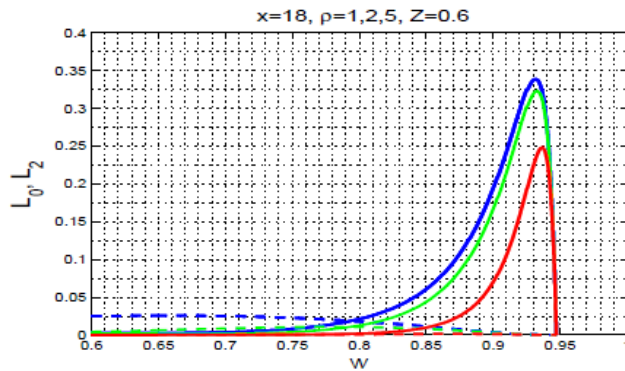
- $\gamma\gamma \rightarrow h \rightarrow \gamma\gamma$

- $\delta(\text{Br}(h \rightarrow \gamma\gamma)\Gamma(h \rightarrow \gamma\gamma)) = 12\% \sim \delta\Gamma_{\text{tot}} = 12\%$

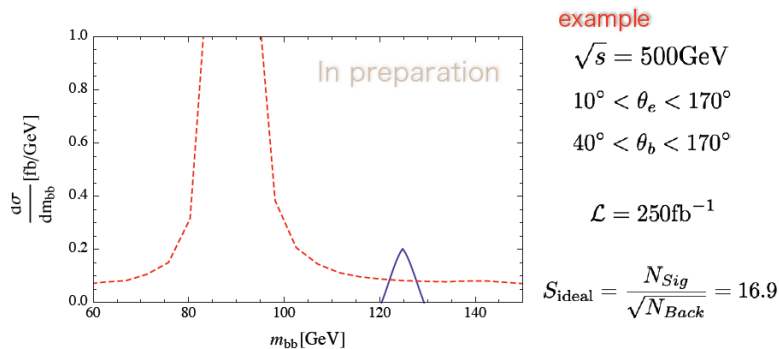
- Heavy Higgs production

Physics

- Testing Higgs Physics at the Photon Collider M.Krawczyk
 - a review of Higgs physics with $\gamma\gamma$ collider
- High Energy Photon Collider I.Ginzburg
 - $\gamma\gamma$ collider with higher X



- Higgs production in electron-photon Collider N.Watanabe

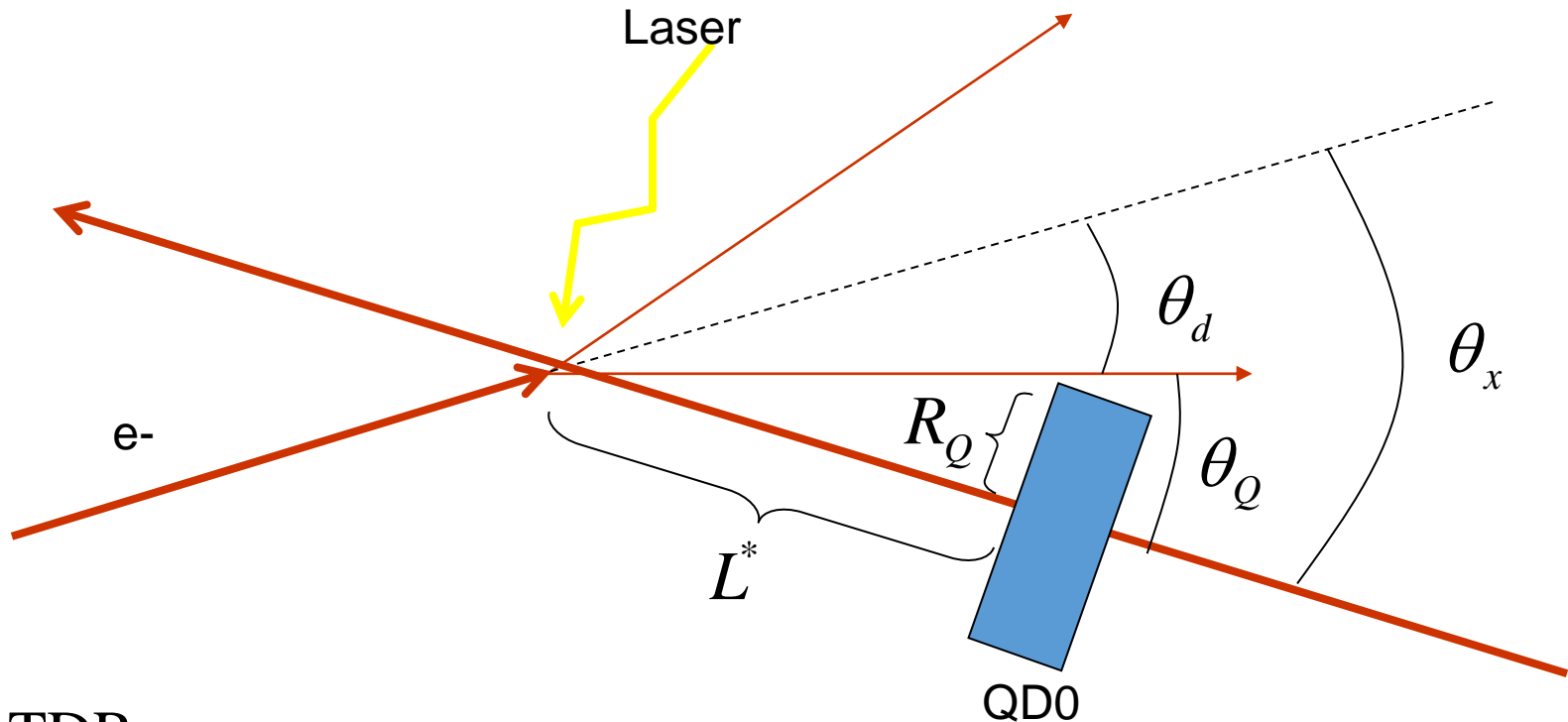


Technology

- Lasers (5 – 10 J/pulse synchronized w/ e- beam)
 - Laser Technologies for the Realization of a Photon Collider
J. Gronberg
Laser Initiated Fusion Energy – LIFE
 - Fibre lasers for gamma-gamma colliders L.Corner
 - Optical Cavity T.T

We can be optimistic that laser technology meets requirements for the $\gamma\gamma$ colliders
(We also must remember there are issues specific for $\gamma\gamma$ colliders)

Crossing angle consideration for $\gamma\gamma$

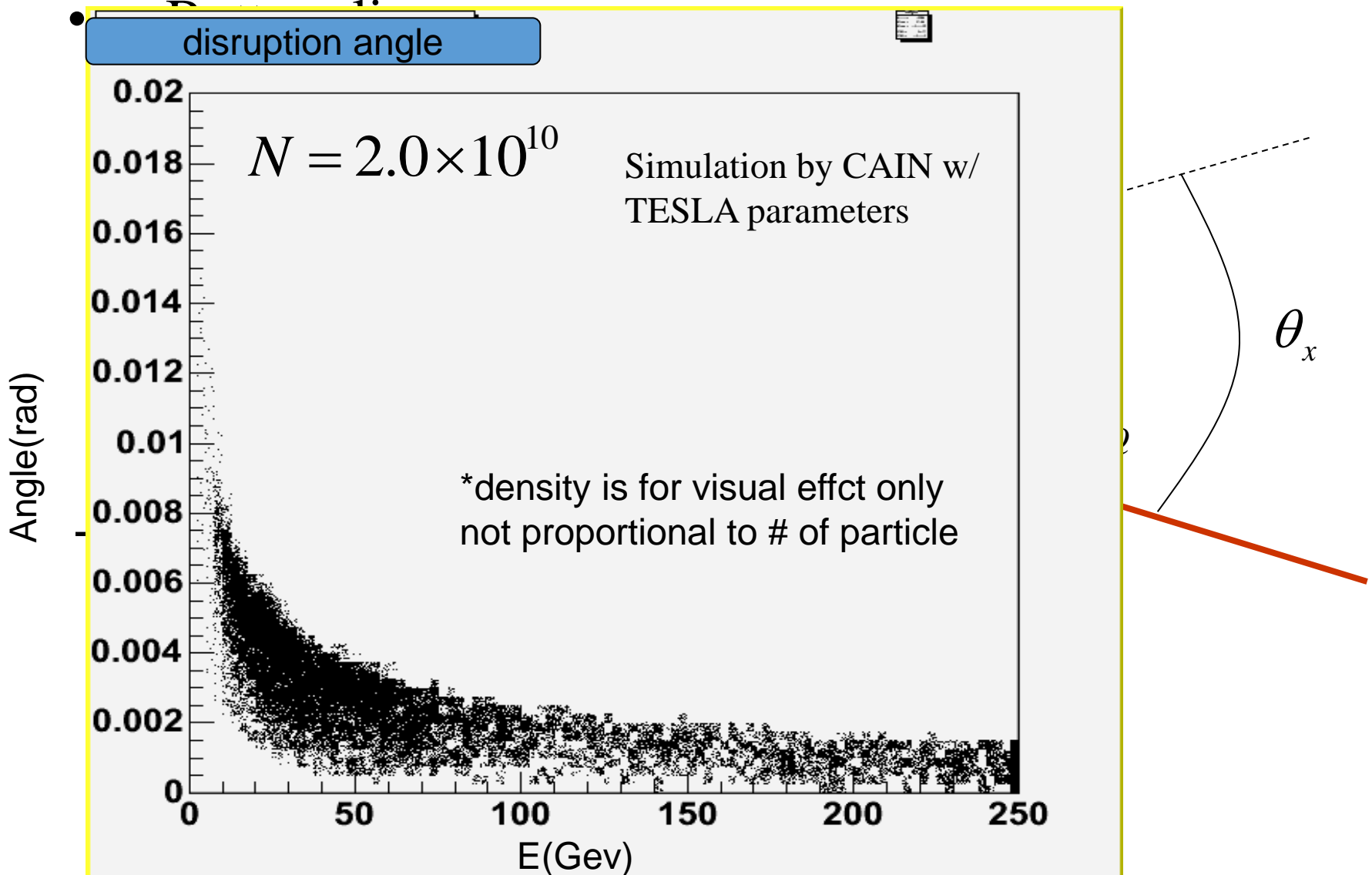


TDR

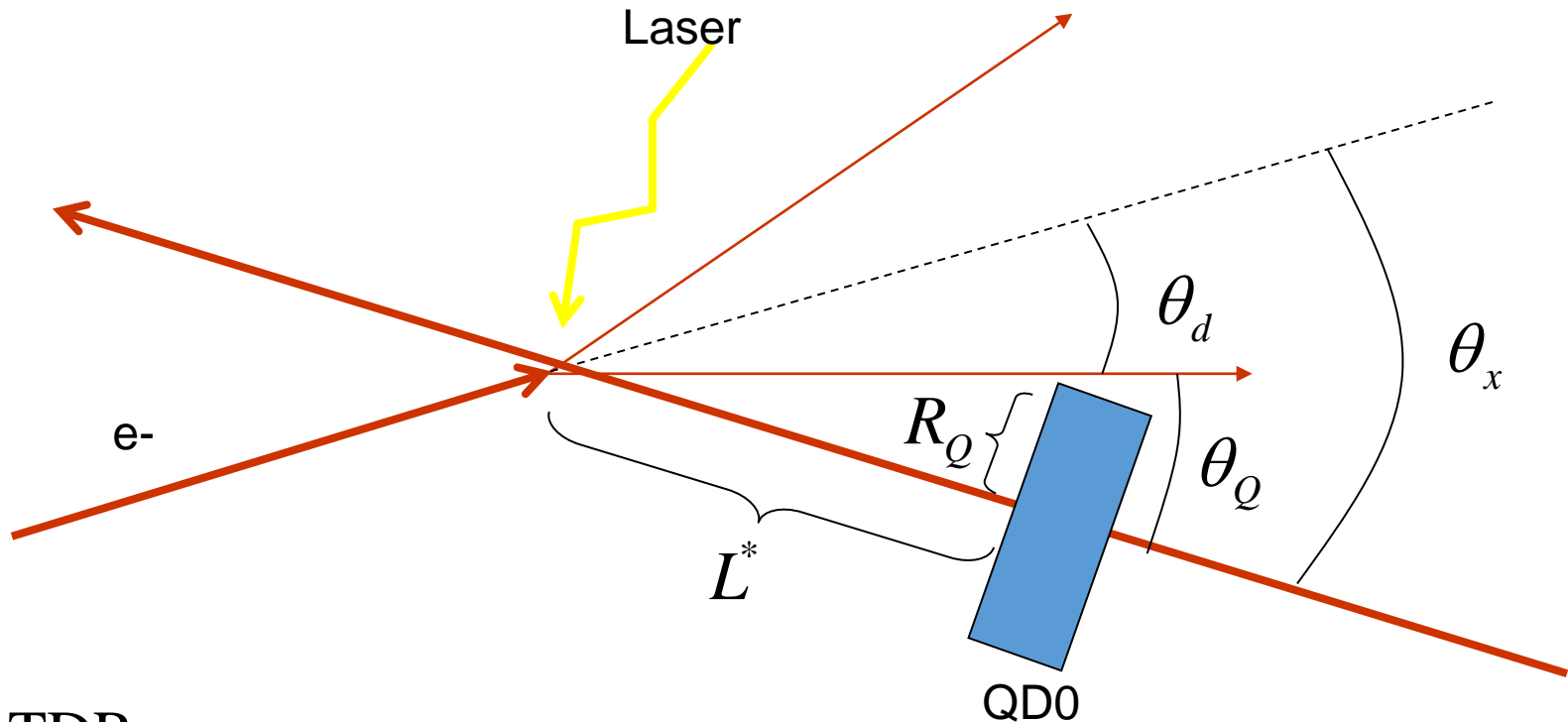
$$\begin{cases} \theta_Q = 9.5mr \\ \theta_x = 14mr \end{cases} \Rightarrow \theta_d = \theta_x - \theta_Q = 4.5mr$$

$\theta_d > 10mr$ is necessary for $\gamma\gamma$ colliders

Crossing angle consideration for $\gamma\gamma$



Crossing angle consideration for $\gamma\gamma$



TDR

$$\begin{cases} \theta_Q = 9.5mr \\ \theta_x = 14mr \end{cases} \Rightarrow \theta_d = \theta_x - \theta_Q = 4.5mr$$

$\theta_d > 10mr$ is necessary for $\gamma\gamma$ colliders

Beam Crossing angle Cont.

- ILC Crossing Angle and Gamma-Gamma Collider
K. Yokoya
 - Detailed design work of civil engineering for ILC will start in a year
 - The crossing angle **must be fixed** by that time
- Crossing angle and beam dump at PLC V. Telnov
 - nominal crossing angle of the PLC is 25mr
 - If it is 20mr, the luminosity of the PLC is **reduced a factor of 2.3** (from 25mr)

25mr is preferable for $\gamma\gamma$,
a systematic study of the impact of 20~25mr on the
e+e- is necessary

Summary and Discussion

- It is reasonable to keep expandabilities of the ILC as much as possible, if they do not affect realization of the ILC e^+e^- .
- The Crossing angle must be fixed in a year (or a half year)

Starting discussion to investigate impact of the crossing angle; 14mr to $20 \sim 25\text{mr}$?

Minimum veto angle of the detector

Angle between the detector solenoid and beam (DID/anti-DID)

Engineering issues, cost,,,

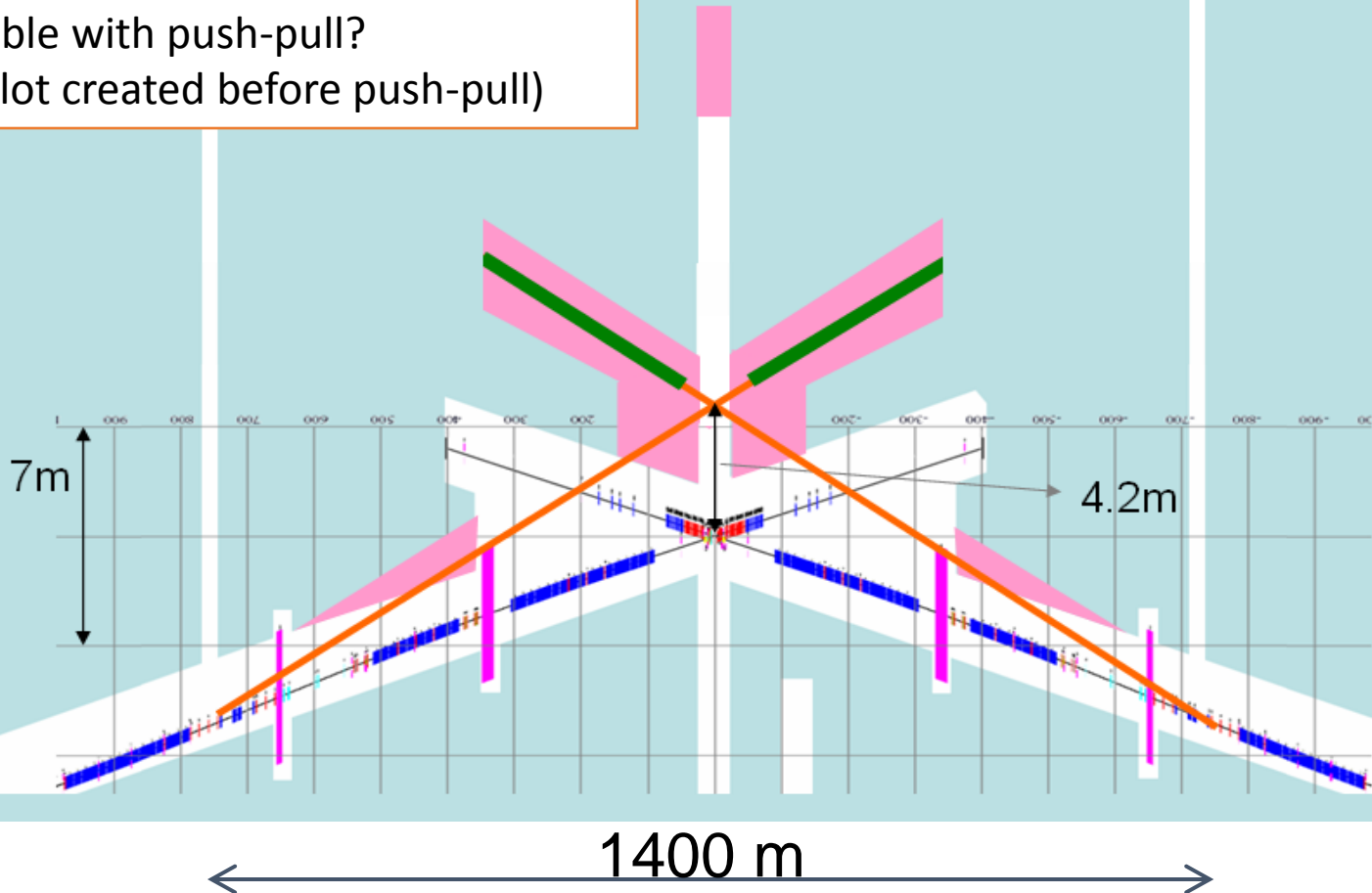
others?

14mr => 25mr

A.Seryi, LCWS06

This doesn't look realistic

- Big CFS work including new main dumps
- compatible with push-pull?
(This plot created before push-pull)



- additional angle is 5.5mrad ($= (25-14)/2$) and detector need to move by about 3-4m