Change Review Panel for ILC-CR-002, "a single L*"

Close-out / recommendations

CRP members:

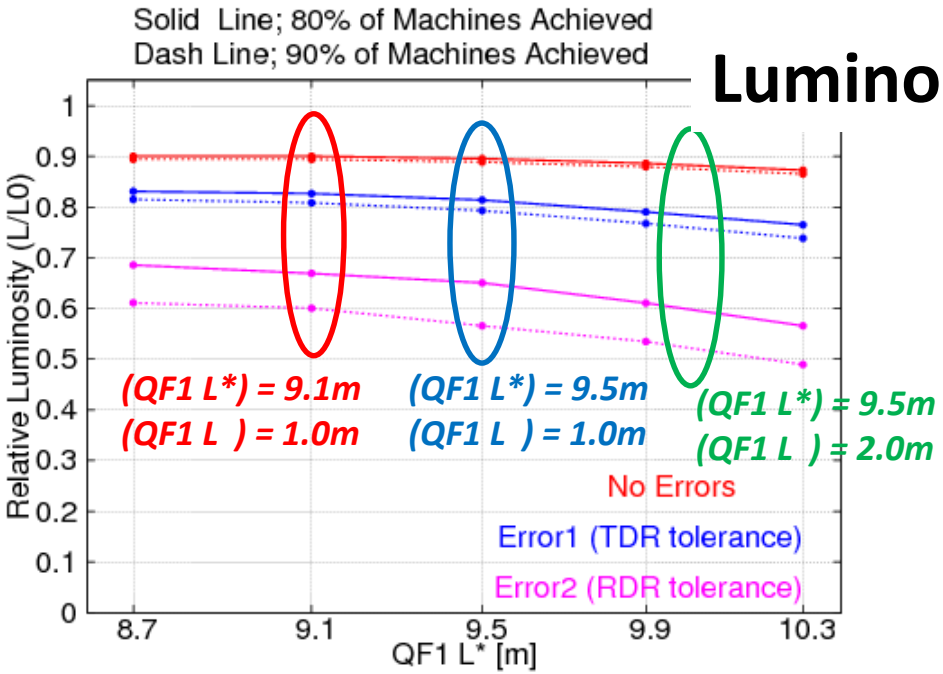
K. Büßer, T. Markiewicz, N. Terunuma (chair), N. Walker, G. White

Summary of a single L* studies by FFS, SiD and ILD

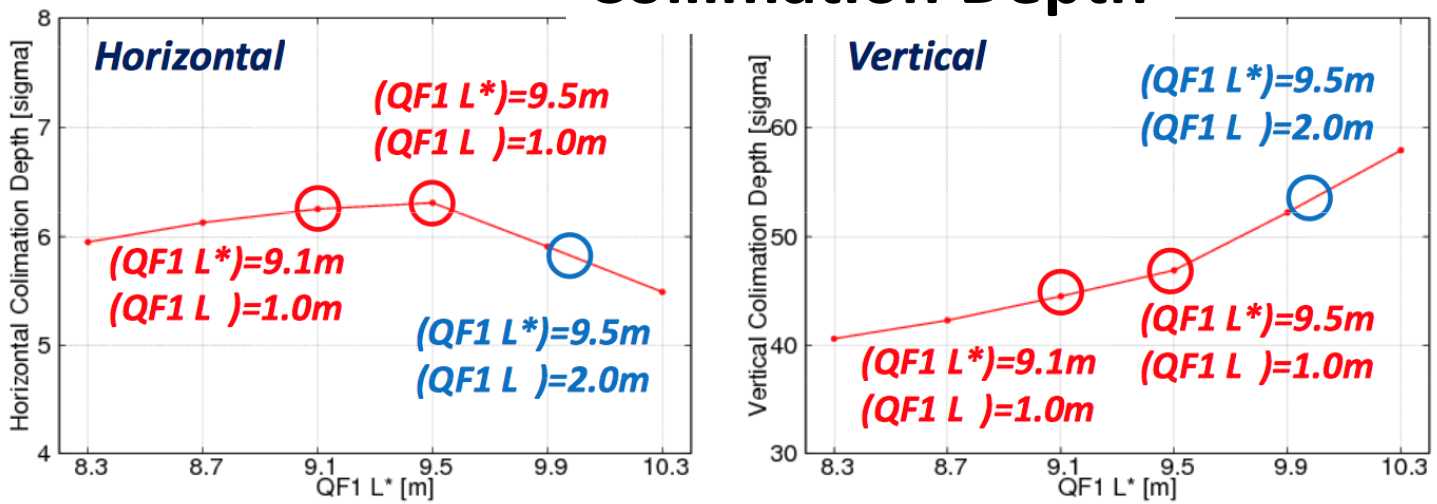
- The BDS studies preferred a smaller L* for vertical collimation depth, while a larger L*, with shorter distance between QD0 and QF1, for tolerances on magnets and luminosity tuning performance. **An optimum luminosity performance is seen with a QD0 L* of around 4 m.**
- **SiD which designed 3.5 m L*, can relatively easily accommodate an L* between 2.6 and 4.5 meters.**
- **ILD, which is currently designed for a 4.5 m L*, can accept the minimum L* of 4.1 m by removing the ion pump in front of QD0.** Current initial studies indicate that the increased IP pressure still produces acceptable (and low) background rates. A fall-back solution using a distributed NEG system is under consideration. Further optimisation and studies on the forward calorimeters looks promising enough to accept the CR at this time.
- **The difference for QD0 L* between 4.0 and 4.1m is negligible from the optics and tuning standpoint.**

FFS Performance Studies

Luminosity



Collimation Depth



T. Okugi, KEK

Recommendations

Common L* of 4.1 m

- Taking all currently available information, the CRP recommends that CR-002 being accepted as baseline, with an agreed-upon common L* of 4.1 m.
- As a further corollary to this study, the CRP also recommends that **QF1 L* be left at the TDR value of 9.5 m.**
- With QD0 L* set at 4.1m, the BDS performance was evaluated for a range of QF1 L* values. A weak dependence is observed when lowering the QF1 L* from 9.5 m, whereas the collimation depth calculations show a preference for an L* of around the TDR design value of 9.5 m.
- Shorter QF1 L* leads redesign of QF1 support structure and Packman both on SiD and ILD.

Recommendations (cont.)

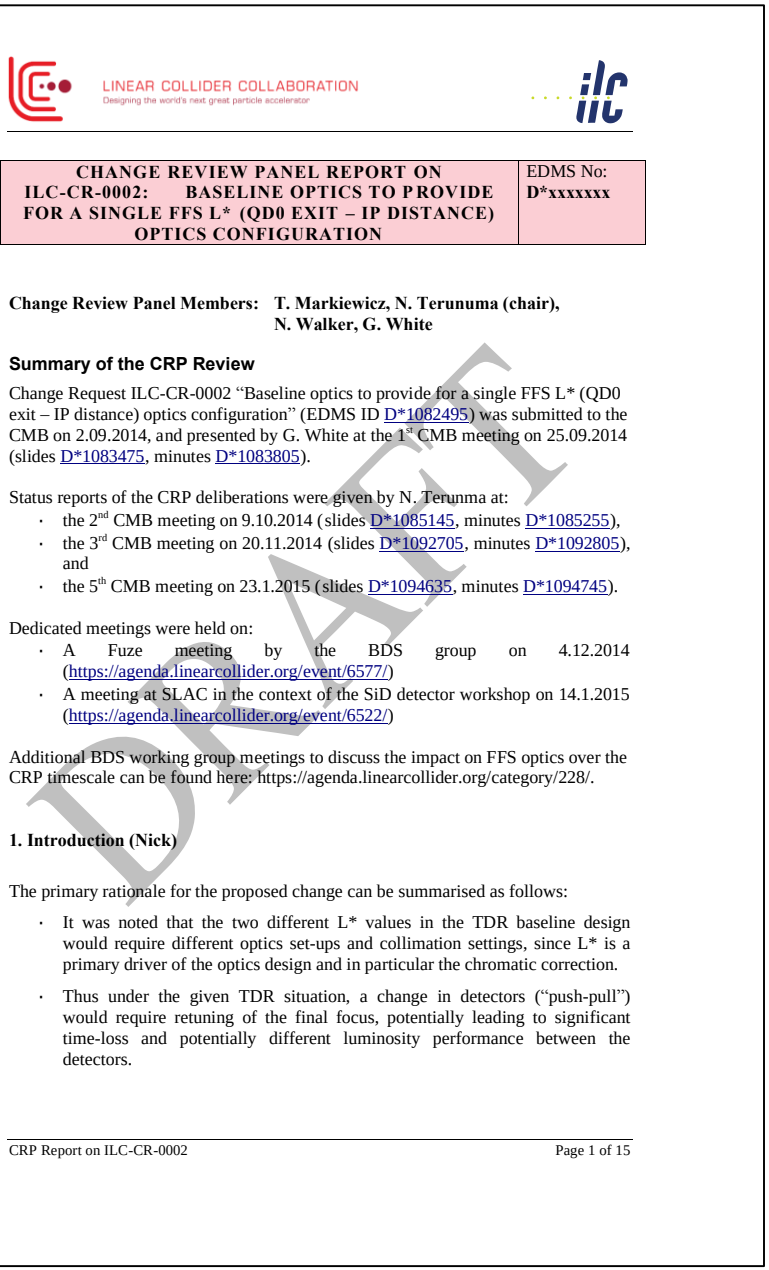
The CRP also makes note of the following related issues that merit further study:

QF1 length:

The BDS studies show the more tangible improvements evident for a **shorter QF1 of 1 m** as opposed to 2 m which they strongly recommend if feasible.

IPBPM:

A BPM located just downstream of QD0 will help the recovery of the beam after the push-pull of detectors and that of after long shutdown, as well as aiding the IP FFBK system.



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CHANGE REVIEW PANEL REPORT ON ILC-CR-0002: BASELINE OPTICS TO PROVIDE FOR A SINGLE FFS L* (QD0 EXIT – IP DISTANCE) OPTICS CONFIGURATION	EDMS No: D*xxxxxxx

Change Review Panel Members: **T. Markiewicz, N. Terunuma (chair), N. Walker, G. White**

Summary of the CRP Review

Change Request ILC-CR-0002 "Baseline optics to provide for a single FFS L* (QD0 exit – IP distance) optics configuration" (EDMS ID D*1082495) was submitted to the CMB on 2.09.2014, and presented by G. White at the 1st CMB meeting on 25.09.2014 (slides D*1083475, minutes D*1083805).

Status reports of the CRP deliberations were given by N. Terunma at:

- the 2nd CMB meeting on 9.10.2014 (slides D*1085145, minutes D*1085255),
- the 3rd CMB meeting on 20.11.2014 (slides D*1092705, minutes D*1092805), and
- the 5th CMB meeting on 23.1.2015 (slides D*1094635, minutes D*1094745).

Dedicated meetings were held on:

- A Fuze meeting by the BDS group on 4.12.2014 (https://agenda.linearcollider.org/event/6577/)
- A meeting at SLAC in the context of the SiD detector workshop on 14.1.2015 (https://agenda.linearcollider.org/event/6522/)

Additional BDS working group meetings to discuss the impact on FFS optics over the CRP timescale can be found here: https://agenda.linearcollider.org/category/228/.

1. Introduction (Nick)

The primary rationale for the proposed change can be summarised as follows:

- It was noted that the two different L* values in the TDR baseline design would require different optics set-ups and collimation settings, since L* is a primary driver of the optics design and in particular the chromatic correction.
- Thus under the given TDR situation, a change in detectors ("push-pull") would require retuning of the final focus, potentially leading to significant time-loss and potentially different luminosity performance between the detectors.

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Report by CRP-002 will be available soon.