Detector configurations for the DGWG studies

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Goal

* Need to define a set of reference detector configurations in FastSim to test the performance of the benchmark channels

* The reference configurations may evolve as the studies go on

	H^+ high $\tan\beta$	Minimal FV	Non-Minimal FV (1-3)	Non-Minimal FV (2-3)	NP Z-penguins	Right-Handed currents
$\mathcal{B}(B \to X_s\gamma)$		🟩		🔴		🔴
$A_{CP}(B \to X_s\gamma)$				🟩		🔴
$\mathcal{B}(B \to \tau\nu)$	🟩 -CKM					
$\mathcal{B}(B \to X_s l^+ l^-)$				🔴	🔴	🔴
$\mathcal{B}(B \to K\nu\overline{\nu})$				🔴	🟩	
$S(K_S\pi^0\gamma)$						🟩
β			🟩 -CKM			🔴

$+ \tau \to \mu\gamma$

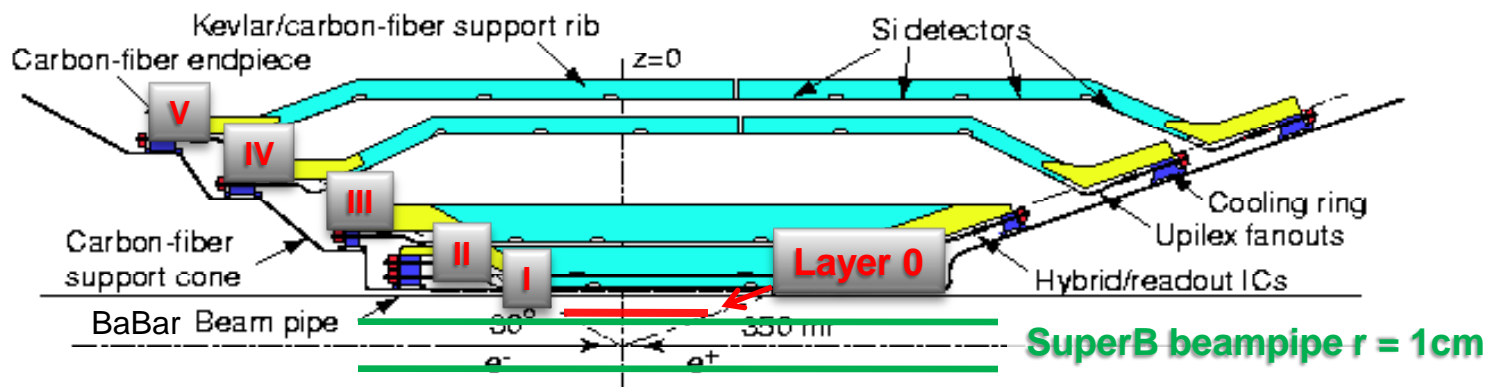🟩 Golden mode for a given scenario
🔴 Non-golden, but still sensitive to deviations from the SM
-CKM requires high precision on CKM parameters (obtainable with SuperB)

2

SVT

* Do we want 6 layers?

Or can we live without layer-**II** given the presence of L0?

* Which option for layer1? (it depends on bkg rates)

The fine-tuning of the SVT internal geometry will be studied separately. Here we want to identify a limited number of basic configurations to test the benchmark channels. **The same consideration also applies to the other subsystems**
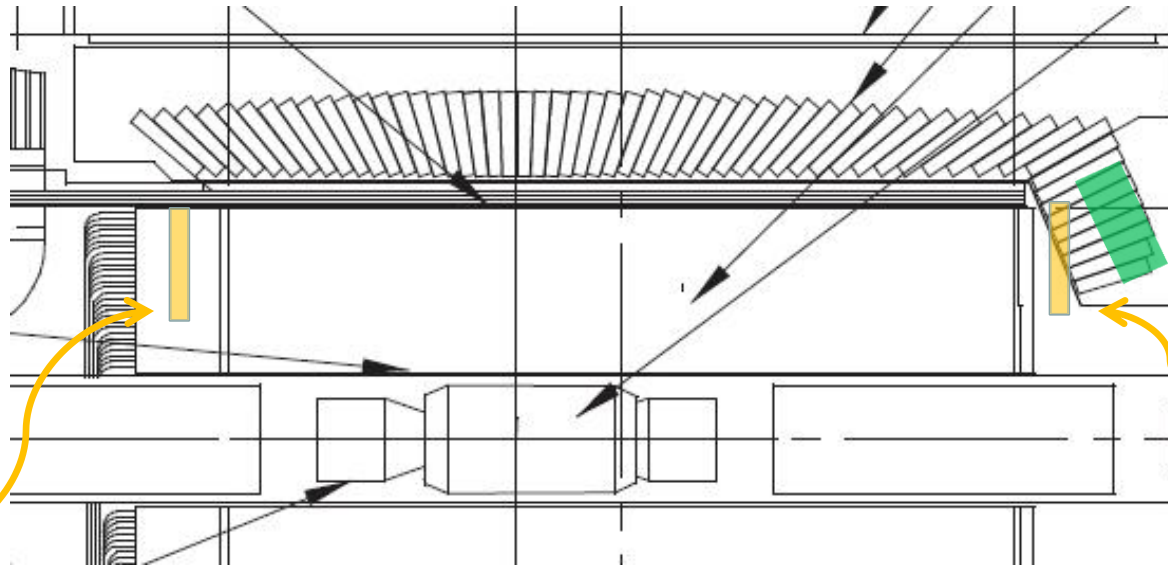
DCH

extended DCH
If LYSO fwd EMC
and NO fwd PID
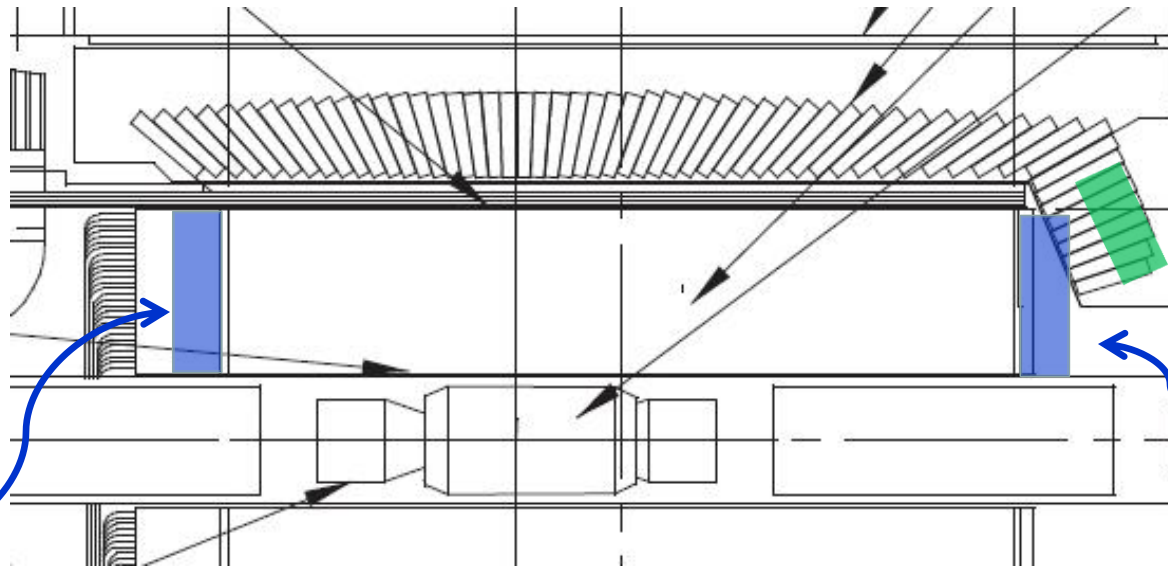
extended DCH
If NO bwd EMC/PID
and the DCH electronics
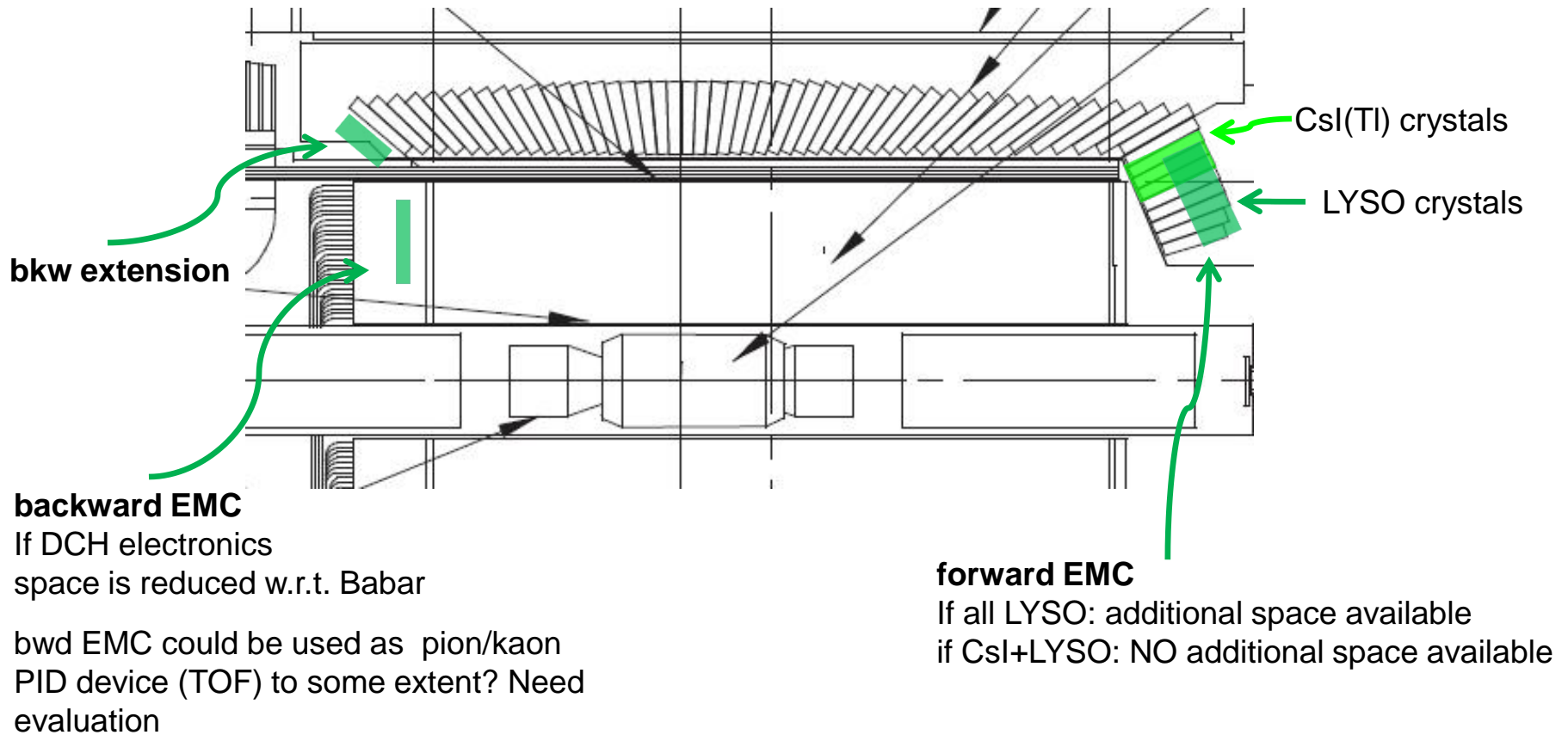space is reduced w.r.t. Babar

PID

forward PID
If LYSO fwd EMC

backward PID
If NO bwd EMC
and the DCH electronics
space is reduced w.r.t. Babar

We're not considering it as a main option

EMC

CsI(Tl) crystals

LYSO crystals

bkw extension

backward EMC
If DCH electronics
space is reduced w.r.t. Babar

bwd EMC could be used as pion/kaon
PID device (TOF) to some extent? Need
evaluation

forward EMC
If all LYSO: additional space available
if CsI+LYSO: NO additional space available

Proposal (Ver 0)

Options

* SVT: 5 layers+L0 / 4 layers+L0
* DCH: Babar size / extended forw / ext. bwd / ext. forw+bwd
* PID: DIRC / DIRC+forw PID
* EMC: forw LYSO / forw CsI+LYSO / with and without bwd EMC
* IFR: 'baseline'

|	SVT	DCH	PID	EMC	IFR
0	5 layers+L0	"babar"	DIRC	fwd LYSO	baseline
1	5 layers+L0	"babar"+bwd+fwd	DIRC	fwd LYSO	baseline
2	5 layers+L0	"babar"+bwd	DIRC+fwd	fwd LYSO	baseline
3	5 layers+L0	"babar"	DIRC+fwd	fwd LYSO+bwd	baseline
4	5 layers+L0	"babar"	DIRC	fwd CsI+LYSO+bwd	baseline
5	4 layers+L0	"babar"+bwd+fwd	DIRC	fwd LYSO	baseline

DCH

* Let's separate the definition of the main configurations from the optimization of all the other aspects.

* <u>Main configurations</u>. The idea behind the proposal in sl. 7 is: if there is space available, it's occupied by the DCH. Is there a consensus on this approach?
  – see also next slide

* <u>Optimization of other aspects</u>. It will proceed within the DCH group with interaction with other systems when needed. If/when a new set of optimized parameters is found, the main configuration may change accordingly
  – internal radius
  – cell size, spatial resolution, axial/stereo configuration
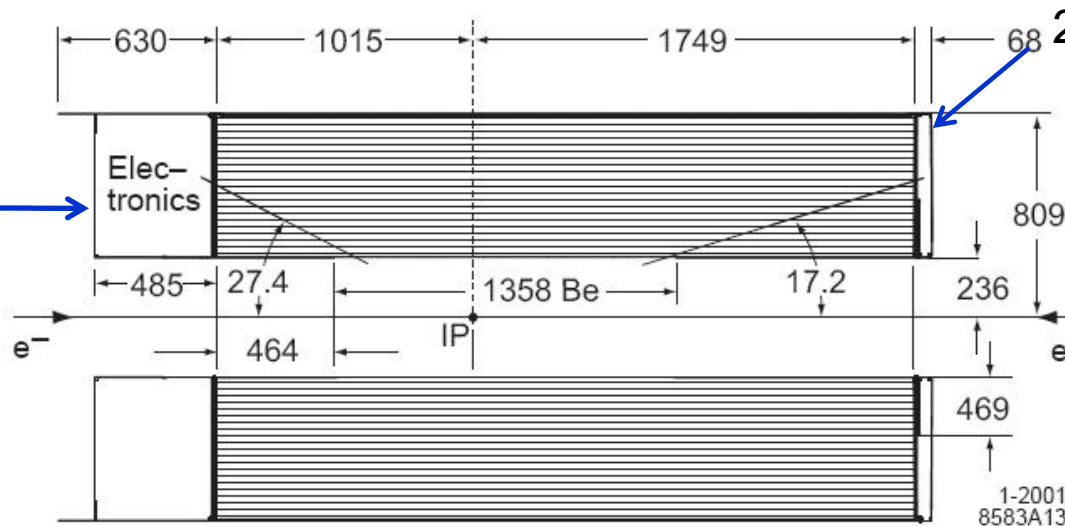 – etc.

DCH

from BaBar NIM, hep-ex/0105044

cal stability of the chamber. The DCH extends beyond the endplate by 485 mm at the backward end to accommodate the readout electronics, cables, and an rf shield. It extends beyond the forward endplate by 68 mm to provide space for wire feed-throughs and an rf shield.
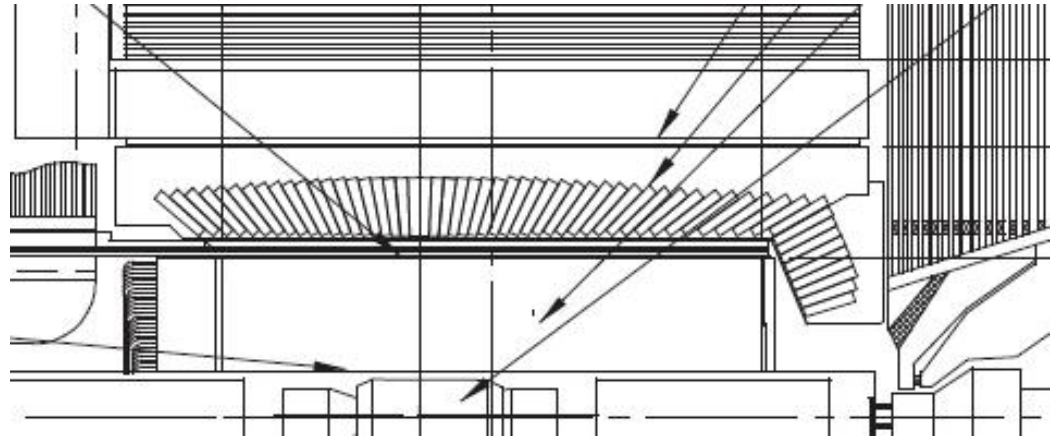
1) how much space
is taken here?

2) and here

3) what inner radius for the default configuration? What wires config?

Summary

*   The DCH group should provide <u>soon</u> the basic configurations to test the benchmark channels listed in sl. 2. Such configurations may evolve in the future.

*   More discussion at the DGWG meeting tomorrow. It will focus on SVT and EMC but it will also involve the other systems.