https://jupyter.ihep.ac.cn/1jElggPCS0yvbRsi5W6XWw

Comments

Overall:

- Change the float option of figure or table to [H]

Physics Requirements, Operation Plan

- Some contents from "Achieving these physics..." to the end of this section, repeat with Table 4.1, "Baseline Requirements and Overall Vertex Detector Design Parameters"
- Typo ***CORRECTED***

Sensor Technology Overview

- The power issues about 65 nm / 180 nm
- Power, Cooling, Data rate...

R&D Efforts and Results

- Overview and why choose CMOS. Ref. surrey(?)

CMOS pixel sensor JadePix series

- Intro to JadePix, like first para of subsection: *MAPS TaichuPix series*

Overview of JadePix development

- 180 nm?
- " However further investigation are needed to understand the test results. " Hidden issues?

Exploring the performance limit of TJ 180 nm process

- ~~"Exploring the performance limit of TJ 180 nm process"~~ to "From 180 nm to 65 nm" ***CORRECTED***
- Typo ***CORRECTED***

MAPS TaichuPix series

- Why from JadePix to TaichuPix ?

TaichuPix specifiction

- Max. Hit Rate for Higgs and Z mode, not just W mode.

TaichuPix-3 performance

- Text in Figure 4.6 *Overall diagram of the detector system* is to large.
- Delete the final para *The hitmap of one example DUT covering the full pixel area is shown in Figure.~\ref{fig:effmap}(a). The efficiency map of two DUTs is displayed in Figure.~\ref{fig:effmap}(b) and ©, respectively, indicating good uniformity.* ***CORRECTED***
- Delete ~~Figure 4.10~~ *\caption{(a) The hitmap of one example DUT under 4 GeV electron beam. The pixels inside the red box are used to calculate the average efficiency of every 10 × 10 pixels. (b) © The efficiency map of DUT$_A$ and DUT$_B$ at the optimal threshold.,* ~~4.11~~ *Vertex detector prototype setup at DESY II TB21.* ***CORRECTED***

Beam test of backup vertex detector prototype

- ~~"4.3.2.3 Beam test of backup vertex detector prototype"~~ to "4.3.3 Prototype of a planer CMOS vertex detector" ***CORRECTED***
- Other structure issues ***CORRECTED***

Stitching

- Title ~~"Stitching"~~ to "Prototype of a stitching CMOS detector" ***CORRECTED***
- Typo ***CORRECTED***

Stitching technology

- Reference to ALICE

Material budget

- Typo ***CORRECTED***
- Table 4.5 *The amount of material for each layer of the detector.* moves to 4.2 ***CORRECTED*** (but needs some explanation I think)

The radius bending test

Prototype process verification

Performance of the MAPS chip after bending

Detector Design

- First para should to be checked, like “we opted for two technological approaches, CMOS and Stitching”

Layout

- The parameters table 4.6 *Geometric configuration parameters.* and table 4.7 *The material budget parameters of the two configurations.* should change the two row, Backup and Baseline. ***CORRECTED***
- Figure 4.37 *Using the longitudinal cross-section of the first layer of the ladder as an example, the second and third layers of the ladder have two additional layers of aluminum compared to the first layer of the ladder.* and “The fifth and sixth layers are constructed using TaichuPix-3 chips” comments is “like (TaichuPix-3), it will not be called Taichu-3” (What that means?)

Background estimation

- Ref to MDI chatper (to do, after merged)
- Typo ***CORRECTED***
- Results after reducing the thickness of sensitive area is waitting to fill.
- May reduce the Figure of distrubution of Hit rate.

Performance

- Move to the end as subsection 4.8, before 4.7 Cost
- Typo ***CORRECTED***

Hit number and efficiency

- Figure convert Hit number to percentage. ***CORRECTED***

Resolution

Under dead sensor

Beam background

Sensors and Electronics

R&D plan

- ???

Stitched sensor prototype design

Sensor architecture and functional blocks

- "The preliminary stitching plan of the silicon wafer and the dimensions of each half layer are introduced in Figure.~\ref{fig:layoutF2}. " move figure layoutF2 to here. (I think place a copy here would be better)
- Typo ***CORRECTED***

Design of the repeated sensor unit

- Lots of figures as well as tables were asked to remove
  - ~~Figure 4.58~~ *Data driven readout timing for column control* ***CORRECTED***
  - ~~Table 4.11~~ *The readout timing sequence* ***CORRECTED***
  - ~~Table 4.12~~ *Signal description* ***CORRECTED***
  - ~~Figure 4.60~~ *Example of 32 bit data format without 8b10b encoding* ***CORRECTED***
  - ~~Figure 4.63~~ *Example of data compression during readout* ***CORRECTED***
- Figure 4.64 *Architecture of the general FIFO architecture \ref{fig:layoutFIFO.1} and shared FIFO architecture in this study \ref{fig:layoutFIFO.2}.* ?(This is comments)

Design of the Left-End Block(LEB)

Power consumption estimates

Mechanics and Cooling

Mechanics

Mechanics

General support strcture

- " As shown in Figure. ~\ref{fig:Mech1}, the side view along the beam direction, this figure demonstrates the general structure of the detector and its integrated mechanical support. " underlined with no comment text.

Ladder and support

Ladder-based barrel and fixation to the beam pipe integration(assembly)

- Typo ***CORRECTED***

Bent MAPS cylinders and fixation to beam pipe

- Too much figures here, move to the section *R&D*.

Cooling

Cooling requirements

Air cooling and simulation

- Typo ***CORRECTED***
- Figure 4.86(Vibration spectrum...) might need to be moved forward.

Services

Waiting to fill:

Alignment and Calibration

Performance

Cost

Summary and Outlook

SR in higgs mode: ~ 1MHz/cm2 (True) for 1st layer,

```
10904069.0      luhancen        03/19 19:43     0+00:00:00      I  0   0.0  sub.sh
```

Analysis is undergoing (large mem needed)

Layer	Ave. Hit Rate MHz/cm^2	Max. Hit Rate MHz/cm^2	Ave. Hit Rate×C MHz/cm^2	Max. Hit Rate×C MHz/cm^2	Ave. Data Rate Mbps/cm^2	Max. Data Rate Mbps/cm^2
Higgs: DataRate = HitRate ×32 bit / pixel × ClusterSize @(Bunch Spacing: 346ns, 53%Gap, 25× 25 μm^2/ pixel)						
1	1.063	1.195	5.897	7.112	188.707	227.583
2	0.322	0.537	1.710	3.045	54.721	97.430
3	0.088	0.177	0.488	0.990	15.630	31.665
4	0.042	0.088	0.242	0.532	7.748	17.027
5	0.011	0.048	0.062	0.312	1.997	9.996
6	0.008	0.033	0.044	0.211	1.404	6.751

~400Mbps/cm2

If change the sensitive thickness from 23um to 10um, cluster(data rate) will be halved

New simulation is running