

FPCCD VTX Work Plan

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FPCCD: Features and R&D issues (1/2)

- Small pixel size ($\sim 5\mu\text{m}$)
 - Sensor development
 - Small size chip; $\sim 6\text{mm} \times 6\text{mm}$ (by 2010)
 - Full size chip; $\sim 10\text{mm} \times 62.5\text{mm}$ (by 2012)
 - Low-noise ($< 50\text{ e}$) readout electronics
 - Front-end ASIC
 - Clock driver
 - Digital signal processor
 - Tests of
 - Spatial resolution
 - 2-hit separation
 - Software development for FPCCD
 - FPCCD digitizer, cluster reconstruction
 - Track finder using super-layer structure
 - B.G. rejection by cluster shape
 - Flavor tagging capability with pair background

FPCCD: Features and R&D issues (2/2)

- Thin active layer thickness ($\sim 15\mu\text{m}$)
 - Wafer thinning ($\sim 50\mu\text{m}$?)
 - Low mass ladder using RVC (Carbon foam)
 - Dummy ladder (by 2011 summer)
 - Prototype ladder with CCD wafers (by 2012)
- Low temp. ($\sim -40\text{ }^\circ\text{C}$) operation for radiation immunity
 - R&D for cooling system using 2-phase CO₂
 - FPCCD has heat source only at the ends \rightarrow Cooling pipe of CO₂ + Cold finger may work (Just an idea. Need simulation study)
 - Hopefully, proof of principle by 2011 summer
 - Radiation hardness study of sensors as a function of temperature
- Readout during train intervals
 - No need for “power pulsing”

Common issues

- Overall geometry
 - Radii of layers
 - Size and number of ladders per layer
- Material budget of end plate?
 - Impact on forward detectors
 - Impact on physics
- Alignment
 - How to adjust w.r.t. the interaction point after push-pull?
 - Laser alignment system (for overall position) in addition to track-based alignment?

Common not only to VTX options
but also to other sub-detectors

Timeline

- By 2011 summer: Parameters which give impact on physics should be frozen
 - Wafer thinning
 - Ladder design
 - Cryostat/Cooling system design
 - Design of CCD and readout electronics: Power consumption
 - Demonstration of tracking capability and radiation immunity
 - Software development (Background rejection, Flavor tag, etc.)
- By 2012 summer: Detailed design to be described in the report
 - Baseline option will be fixed (?)
 - Full size prototype ladder
 - Detailed engineering design

Timeline

