

Discussion about next sensor productions

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Early Summary

- By CD2/3 review (10/2024), the EIC detector design should be 90% final (70-80% is not ideal but acceptable).
- Encouraging results from the sensors from the first HPK production.
- Next HPK production(s), ideally tested in Spring 2024 focus on
 - Improve timing resolution for strip sensor, and spatial resolution under the metal for pad sensors
 - Produce large sensors in preparation for module prototyping, cost/yield estimates
 - Test beam time at DESY in June 10-23 reserved

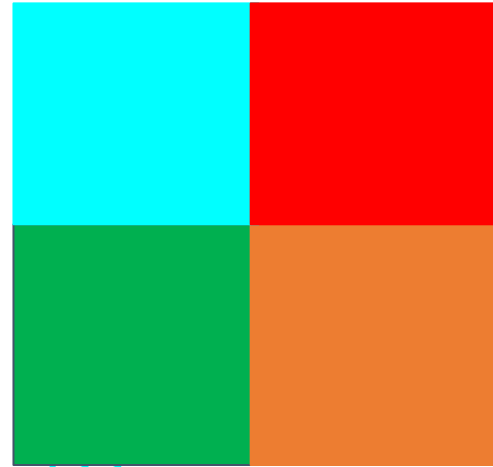
Next HPK Production - Pixel Sensors

Our baseline: 32*32 pixels with 500 um pitch, total area 1.6*1.6 cm²

HPK: one wafer can include twenty 1.6x1.6 cm², two types

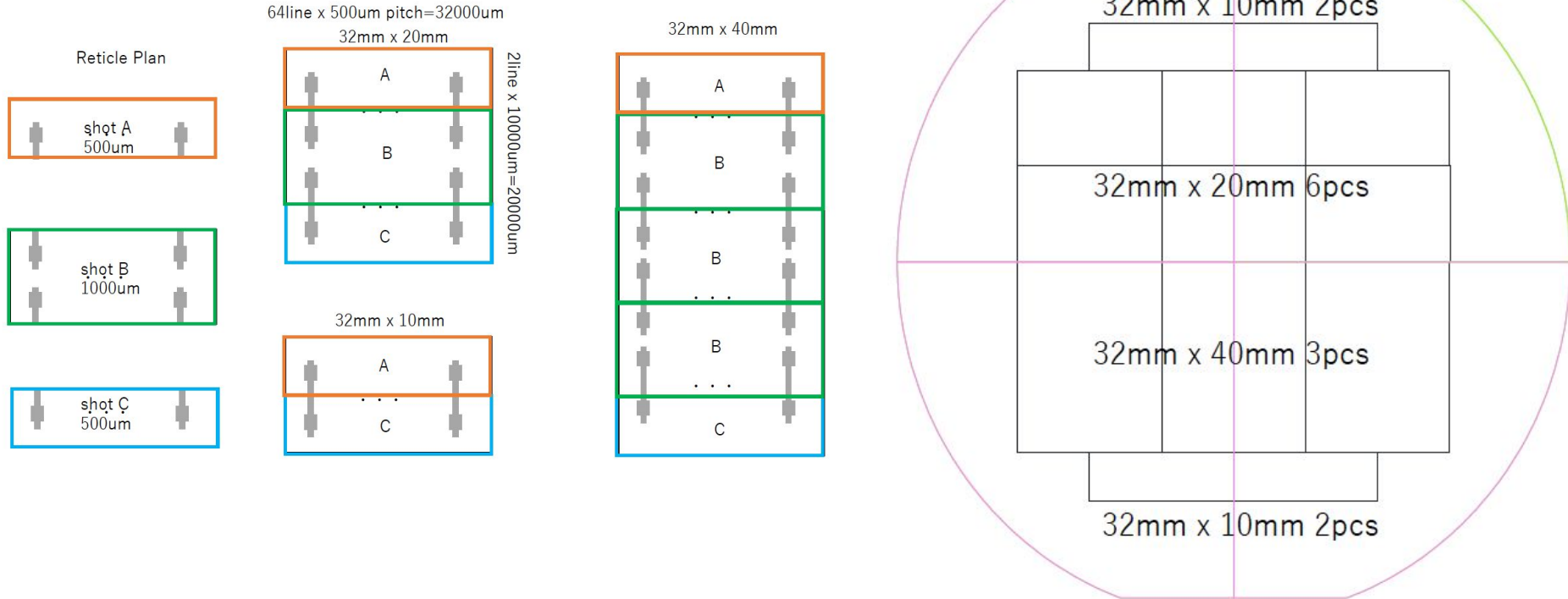
My proposal:

- Two wafers: 20 um thick, C-type, 600 pF/cm²
- Each wafer has
 - 10 dies with 50 um metal width*
 - 10 dies with 100 um metal width*
- A die 1.6*1.6 cm² include
 - 16*16 pixels with 500-um pitch 150 um metal width
 - 16*16 pixels with 500-um pitch, either 50 or 100 um metal width
 - 10*10 pixels with 750-um pitch, either 50 or 100 um metal width
 - 8*8 pixels with 1000-um pitch, either 50 or 100 um metal width



Proposal to Stitch Strip Sensors by HPK (11/14)

Wafer layout plan



Next HPK Production - Strip Sensors

Our baseline: 64*4 strips with 500 um pitch and 1 cm length, $\sim 3.2 \times 4 \text{ cm}^2$

HPK layout: a wafer include four 3.2×1 , six 3.2×2 , three $3.2 \times 4 \text{ cm}^2$ sensors

My proposal:

- Still have four 3.2×1 , six 3.2×2 and three $3.2 \times 4 \text{ cm}^2$ sensors on a wafer as the HPK layout. But instead of $64 \times N$ ($N=1, 2, \text{ or } 4$) strips on a sensor, have 4 regions with different pitch/width on a sensor, namely
 - $12 \times N$ strips with 500 um pitch, 1 cm length, 40 um width
 - $12 \times N$ strips with 500 um pitch, 1 cm length, 50 um width
 - $12 \times N$ strips with 750 um pitch, 1 cm length, 50 um width
 - $11 \times N$ strips with 1000 um pitch, 1 cm length, 50 um width
 - The sensor area will still be 3.2×1 , 3.2×2 or $3.2 \times 4 \text{ cm}^2$
- Assume (require) yield $> 50\%$, produce
 - Two wafers: 30 um, E-type, 600 pF/cm^2
 - Two wafers: 50 um, E-type, 600 pF/cm^2

First FBK Production

- Fermilab and UCSC are RD50 members. Expect a handful devices
- Sensor design?
- Testing plan?