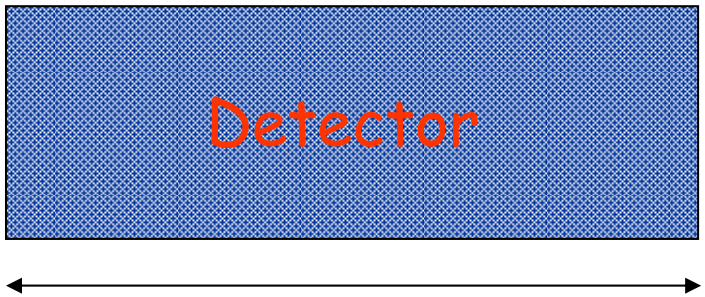
# Summary of the meeting at LBL about the FP420 3D detector layout

- Present:

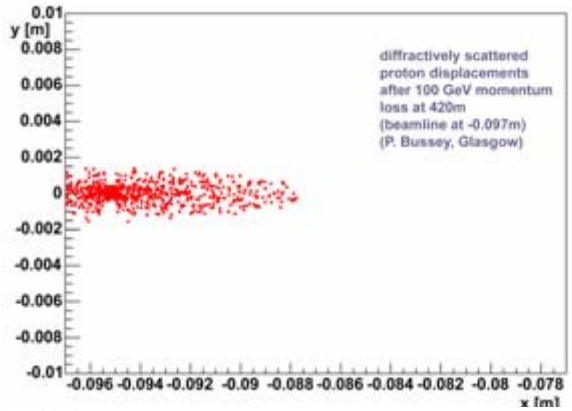
C. Da Via, J. Hasi, C. Kenney, S. Parker, M. Garcia-Sciveres – inputs from Scott Kolya-

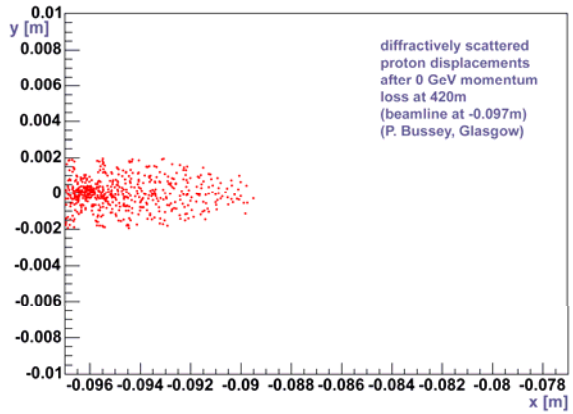
# Detector size and layout for best resolution (10-15 μm in x and y)

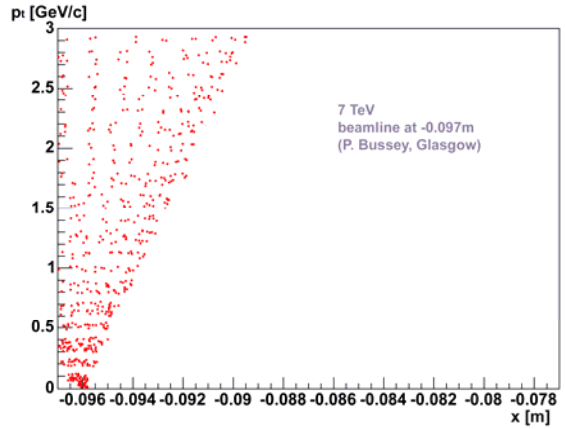



5-10 mm
(40-50mm pitch)

15-20 mm – (40-50mm pitch)



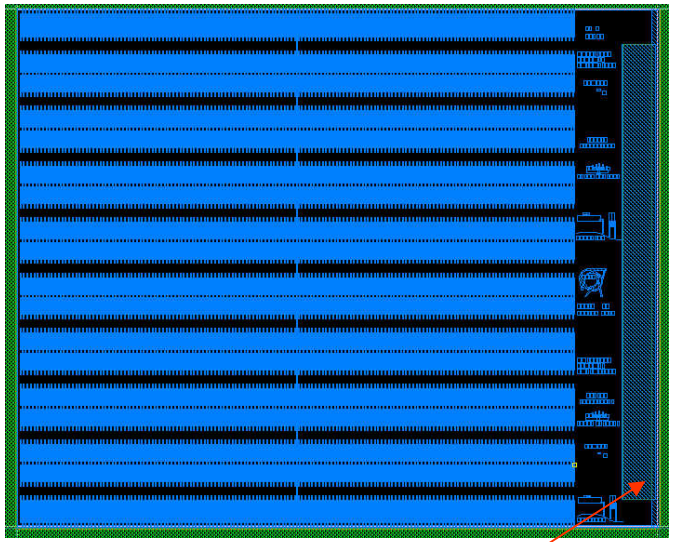



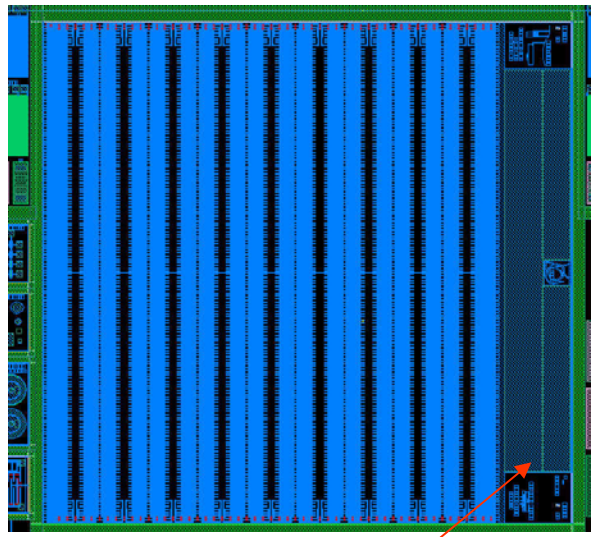

Leading diffractive protons seen at 420m ($\beta^* = 0.5$m)

# H and V orientations : Field Electrode Bias Tab (C. Kenney)

Wire Bond or Conductive Adhesive 1 mm wide



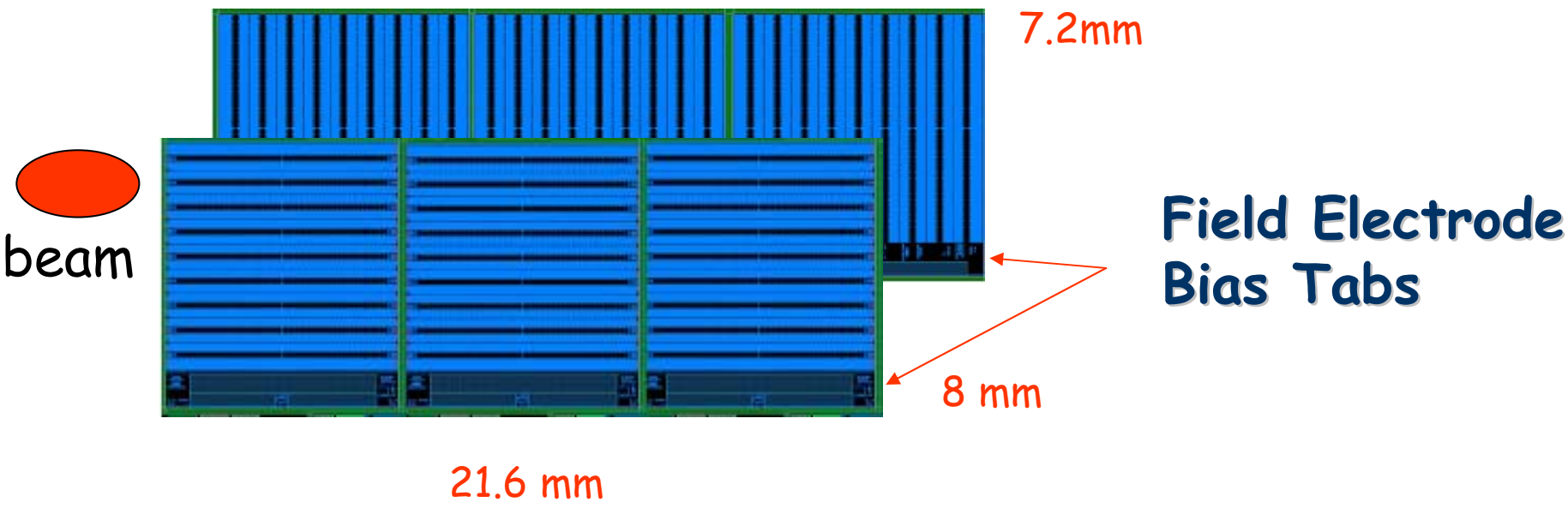
Column bias-tab

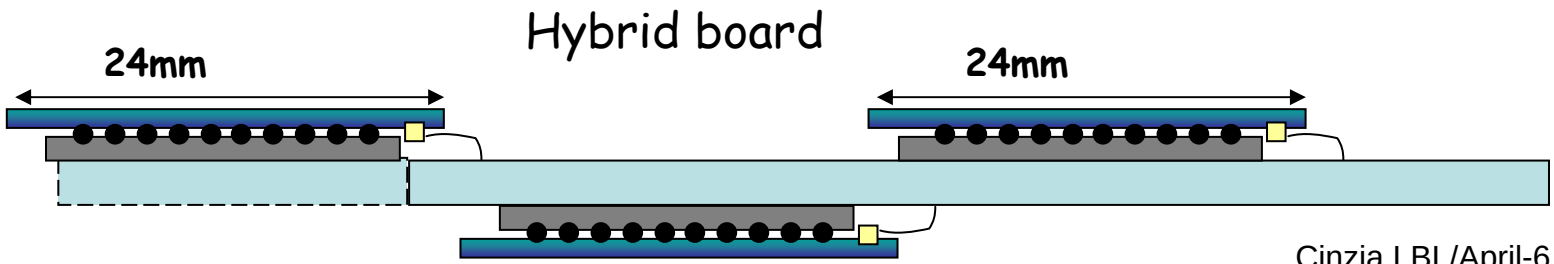


Row bias-tab

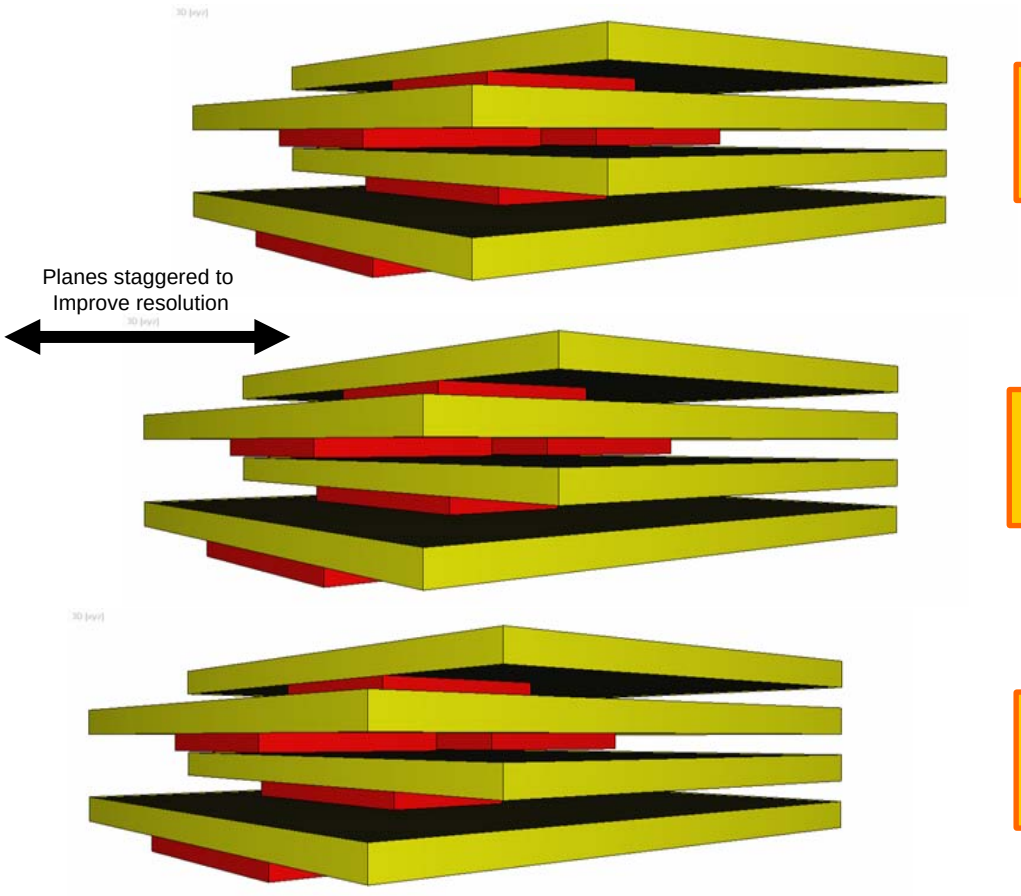
# Combining horizontal and vertical planes

$$\sigma_{x,y} = \frac{50\,\mu\text{m}}{\sqrt{12}} = 14.4\,\mu\text{m}$$



# Detector Station built from a number of superlayer



Planes staggered to
Improve resolution

Service Circuit

Service Circuit

Service Circuit

Independent connections for readout,
VCC, bias etc inside the closed vessel.

FeedThru

Kapton

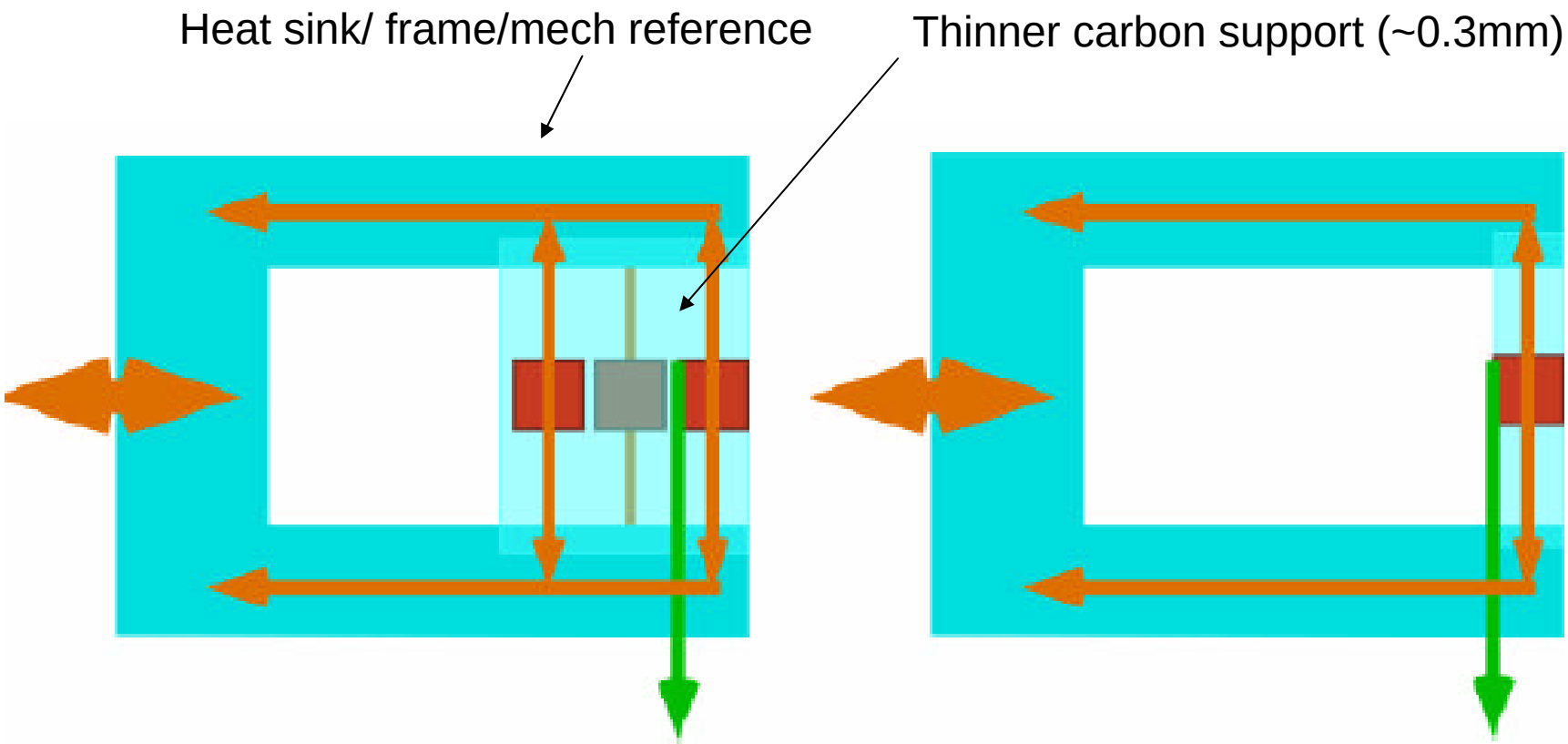
Mech/Therm

3D Sensor

FE ASIC

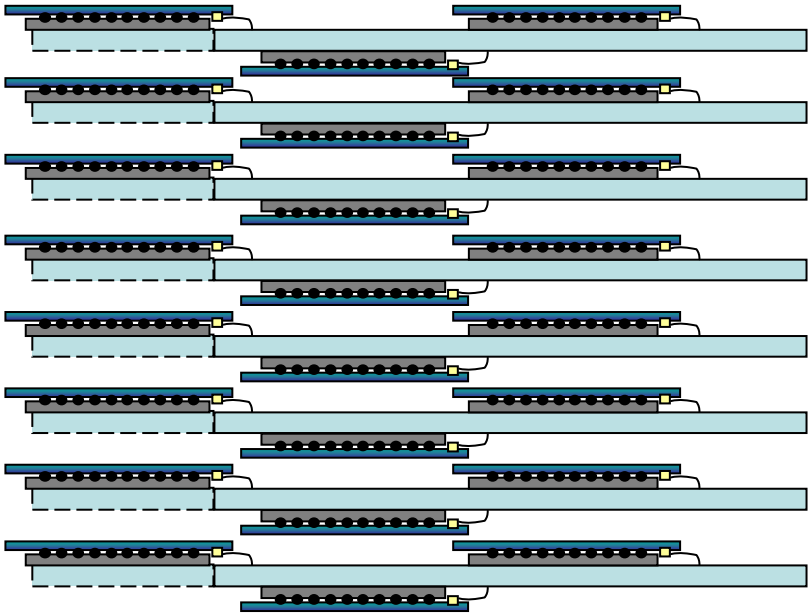
Scott Kolya- Manchester

# Cooling options (Scott)



# 3D + Atlas pixel parameters estimated

**-power dissipation: (the depletion voltage for the sensors, two low voltages for the front-end chips and the module controller chip and three low voltages for the operation of the optical link: http://www.slac.stanford.edu/econf/C020909/skpaper.pdf)**



**0.7W/cm2**

**0.4W/detector and 1.2W/plane.**
**12W / station (10 planes)**

**-highest supported temperature**
**~105C hybrid**

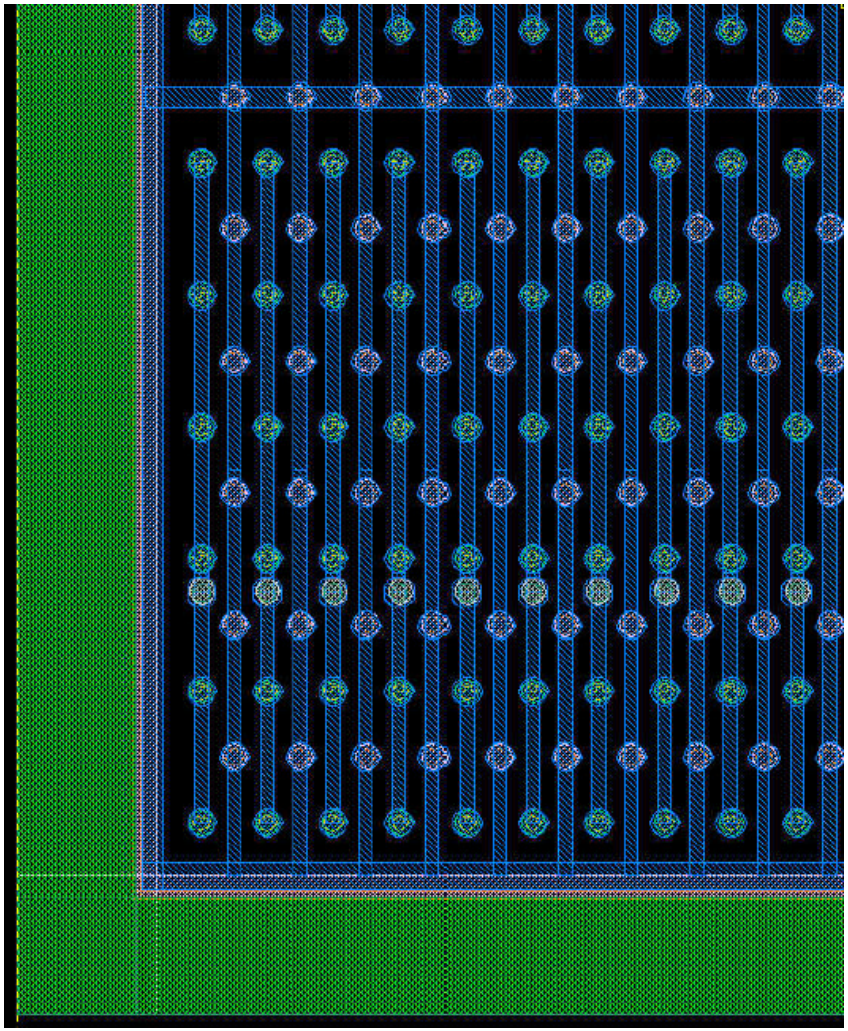
**~200C detector+electronics**

**-thickness of 1 plane (detector+electronics+board)**
**0.5 mm+ 0.3 carbon-carbon support (detector region)**

**~2mm (hybrid frame)**
**~25mm/station (10 planes)**

**-weight**
**~36g / 1 board**
**~360g / station (10 planes)**

# Side Cells (Chris)



Add More Electrodes

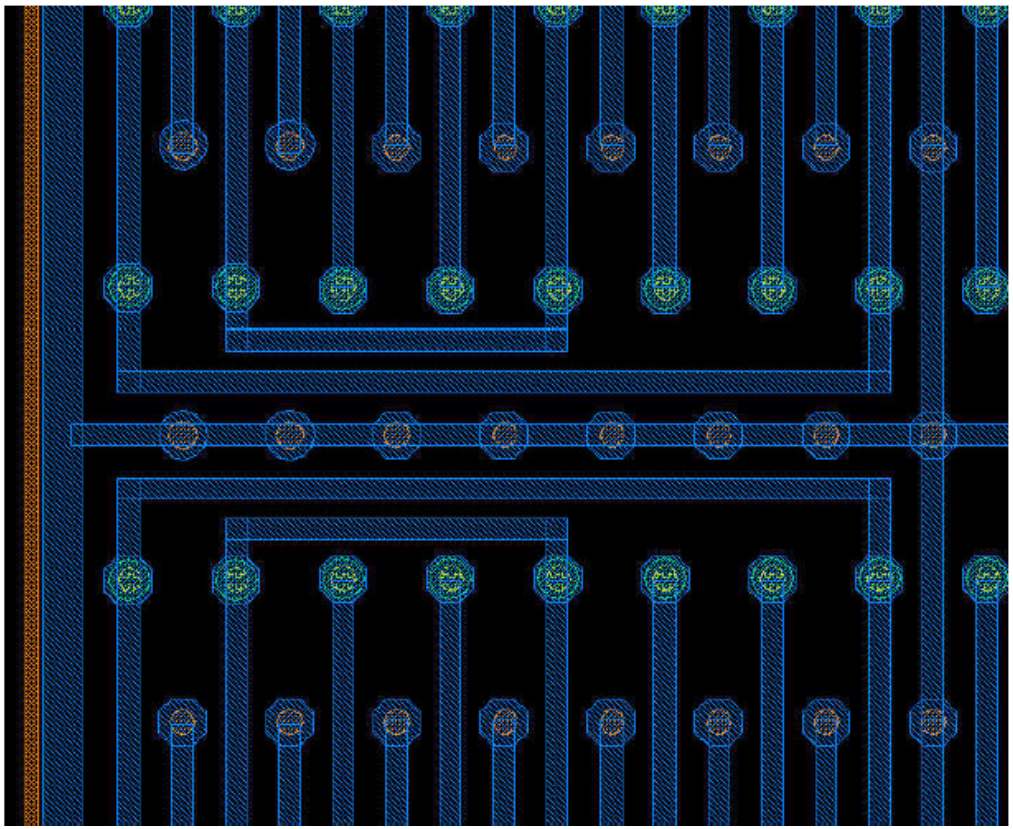
to Side Cells

2E – 600 microns

3E – 134 microns

4E – 115 microns

# Bottom Cells (Chris)



Gang Together Two

Pairs of Pixels

Separated by At

Least 3 Intervening

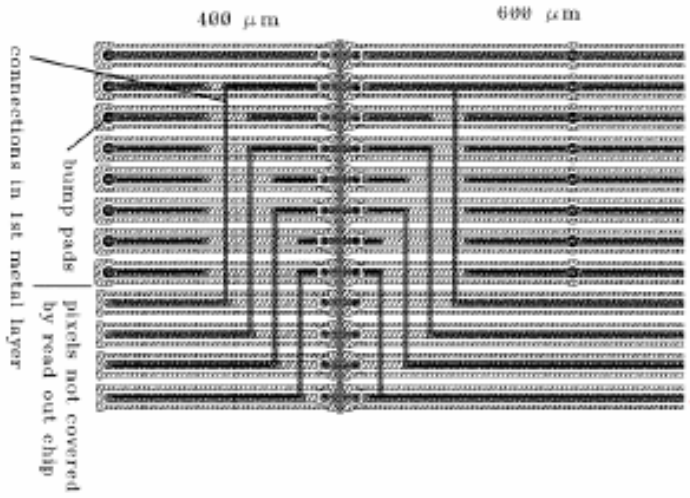
Pixels

– Eliminate Ambiguity

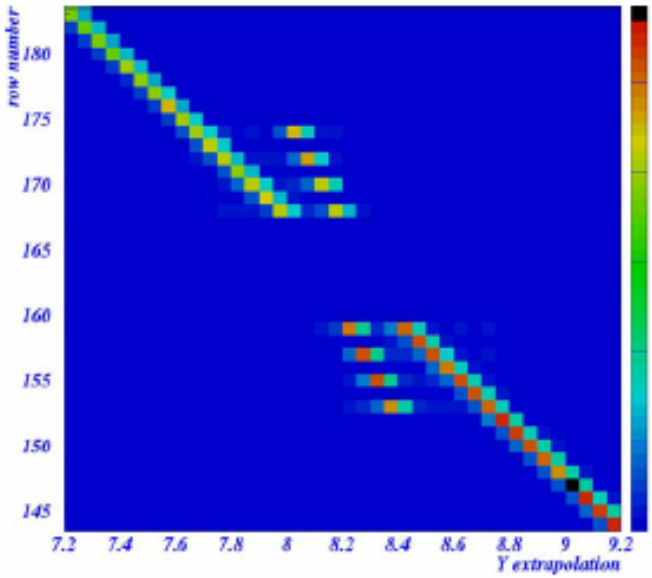
Adds 115 microns to

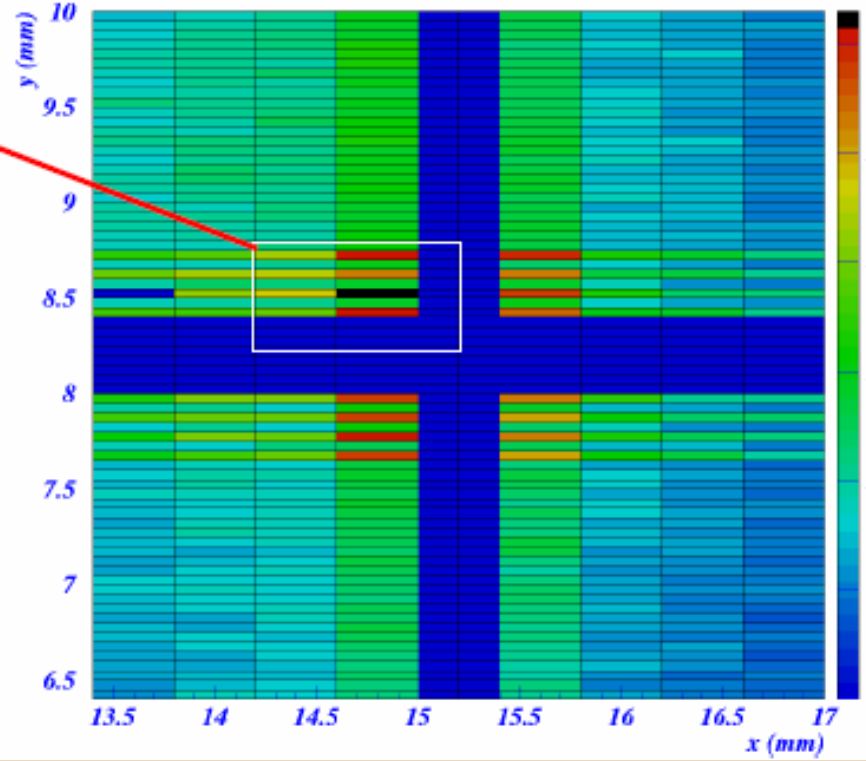
Sensor Bottom Edge

# Ganged and Long Pixels

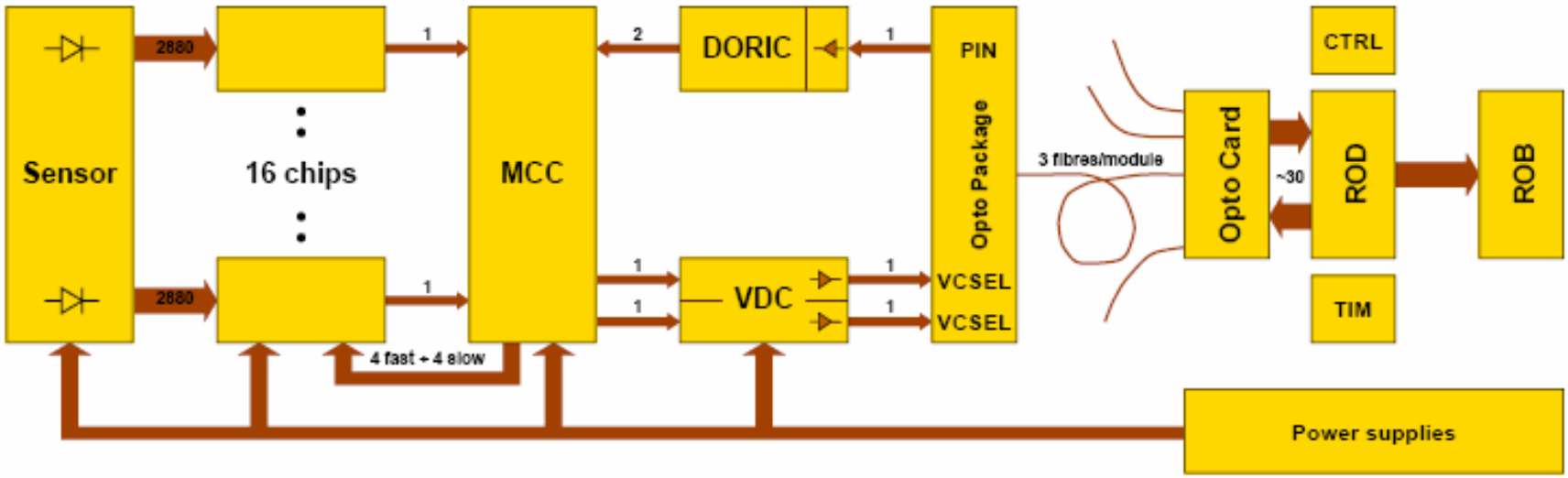



In the region between different FE chips pixels are either longer (600μm) or ganged (see layout). The effect of this can be observed both in pixel counts (below) and in correlations (for the ganged pixels) with extrapolated tracks (lower left picture).



# System Architecture




module

- 1 Sensor
- 16 Front End chips (FE)
- 1 Module Controller Chip (MCC)
- 2 VCSEL Driver Chips (VDC)
- 1 PIN diode receiver (DORIC)

control room

Optical Receivers
Readout Drivers (ROD)
Readout Buffers (ROB)
Timing Control (TIM)
Slow Control, Supplies



Cinzia LBL/April-6

Plans :

June-July06 lab test with bump-bonded 3D sensors (?)
August 06 test beam
Summer 06 test setup in house
Autumn 06 module prototype
Dec 06 preparation of Reports and draft-TDRs (Atlas and CMS)

1st step: Superplane prototype would require:

~10-FE chips + sensors
2 MCCs chips even with faulty channels)
1 opto-board (VDC DORIC?)

TPLL
TPCC (PCC to type0 adapter board?)

2nd step supermodule:
~36 chips+sensors  6 MCC 5 opto-boards (VDC-DORIC?)

Burn-in setup?
ROD?

# Conclusions

- TPLL, TPCC are on their way to Cern
- Fully functional hybrid board
- MCC (faulty, will need to be diced)
- Opto-hybrid – non advisable, problems with production

- Test bench should be ready before summer

# Test beam plan

1 wafer has been sent to IZM/Bonn to be bonded

- 10 detectors will be bump-bonded to single atlas pixel chips:
- 6 x 3E
- 2 x 2E
- 2 x 4E

Fpix/3D will be bump-bonded at Stanford